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ABSTRACT

This guide is to be used as a resource for teaching metrics at various educational levels in the home economics program. The lessons are intended for flexible use by the teacher, and the contents can be adapted for use with varying abilities, ages, and teaching-learning situations. Categorized into ten units, each unit includes concepts, objectives, supportive learnings, sampling of experiences and evaluation, charts, and diagrams. The ten units are: (1) History of Measurement, (2) The International System of Units (SI), (3) The Metre (Length/Area), (4) The Litre (Volume/Capacity), (5) Grams and Kilograms (9) Using Metrics in Clothing Labs--Metric Chef's Hat, and (10) Windows and Window Treatment. The appendixes include: Metric Test, Metric for Preschoolers, Metric Doll (Elementary-Middle School), Introduction to Metrics (Transparency Series), Centimetre Grid, Games, and Bulletin Board Ideas. (HD)

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ED132386

METRICS

A Resource Guide for Home Economics

FINAL REPORT

Developed and disseminated pursuant to EPDA grant No. 51049-5

with the

U. S. Office of Education, Region 3

and the

Bureau of Vocational, Technical and Continuing Education
Pennsylvania Department of Education
Harrisburg, Pennsylvania 17126

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
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Indiana, Pennsylvania 15701

CE 009 153

Instruction in the metric system became a reality when the State Board of Education adopted Regulation 5.52 Metric System (Elementary School) and 5.77 Metric System (Secondary School) on September 13, 1974.

Practically all aspects of our society will be operating under the metric system by the time the present classes in kindergarten classes are graduated from high school. Distances driven will be measured by kilometers; milk consumed will be measured in liters and a box of cereal purchased will be weighed in grams.

Since the home economics program focuses on helping individuals and families to improve home environments and the quality of family life, students need to be exposed to the metric system. Instruction in metrication needs to be integrated throughout all subject matter areas of the program. Therefore, teachers are encouraged to use this resource guide as they plan to offer instruction in metrication in the home economics program.

"Metrics, A Resource Guide in Home Economics" was developed by workshop participants under the direction of Dr. Ruth Anderson, Home Economics Education, Indiana University of Pennsylvania, funded through an EPDA grant. This group is to be commended for this fine publication, as it will serve the home economics programs and ultimately prepare the students enrolled in home economics programs of the Commonwealth to become better decision makers, consumers and homemakers.

Carolyn M. Kratz
Senior Program Specialist
Home Economics Education
Pennsylvania Department of Education

PREFACE

In response to the increased national tendency to adopt the metric system as the nation's primary system of measurement, the Pennsylvania State Board of Education on September 13, 1974 established regulations providing for instruction in the metric system.

For secondary schools, the regulations (5.77) state that:

> *The concepts of measurement in all subjects shall be taught emphasizing the use of the metric system and referring to the English System only as special requirements demand its use. Specialized courses such as science and mathematics shall utilize whatever measuring system is consistent with the specialized measuring activities of the discipline. Instruction in measurement shall be concerned with those measurement skills and units used in everyday life, except for specialized courses where extensive measuring activities are required, and shall be concerned with the understanding and use of the system of measurement.*

A changeover to the metric system became inevitable with the signing of the Metric Conversion Act by President Ford in December 1975. An historic step giving official federal sanction to a change that has been taking place rapidly in the past several years, the Act provided for a U. S. Metric Board of 17 members to devise and carry out a broad program of planning and coordinating voluntary acceptance of metric units as our primary measurement system.

Funded by an EPDA grant, a metric workshop was conducted at Indiana University of Pennsylvania in June 1975. This guide is a compilation of ideas, developed by workshop participants, to be used as a resource for teaching metrics at various educational levels in the home economics program. The lessons are intended for flexible use by teachers; the *content can be adapted for use with varying abilities, ages and teaching-learning situations. The "hands-on" approach was recognized as the best method to learn the system and THINKING METRIC, rather than converting between the customary and metric systems, was emphasized. However, throughout the lessons comparisons have been made to emphasize the advantages of the metric system.*

SI (International System) spellings for metre and litre are used throughout this document, with the exception of National Bureau of Standards reprint which predates the international agreement on SI spelling.

Permission is hereby granted for the reproduction and utilization of these materials.

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Thanks are due also to Mrs. Mary Jean Rose, homemaking teacher, who was kind enough to review the manuscript and to supply important suggestions.

Much appreciation is also due to Miss Marsha Lockard, secretary at Indiana University of Pennsylvania, who cheerfully performed the many secretarial duties necessary to produce this publication.

The last group to be cited, but valued highly, were the workshop participants who gave of their time and talents by responding to inquiry and supplying the materials for the project. Without their contributions the project could not have succeeded:

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Unit I

CONCEPTS: History of Measurement
Status of Conversion - U.S. and World

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After participating in classroom activities, the student will be able to: recognize the need for metrication	There are about 80 units of weights and measures in the customary system we use; unrelated, illogical and requiring different factors to convert. A standard measurement system is necessary for communication and trade.	"Are You Ready for the Metric System?" Divide class into groups of 4 or 5 students. Each group will be given one measurement form in our customary system. (ex: length, weight, or volume). Each group will buzz as to the terms used to measure each and record these on the chalkboard. Given a sheet of paper, each group will then list as many equivalents using those terms as possible. (ex: 12 inches = 1 foot). Discuss. Summarize with transparency: "Customary Metric"
chart the trend toward metrics by listing at least 5 historical events in its development	The first standards were based on the dimensions of a king. Every monarch or king revised the method of determining measurements. An acre was the amount of land a pair of oxen could plow in one day.	View and discuss transparency depicting history of measurement. Appoint two students kings and compare various measurements. (yard, cubit, foot)

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
	digit - width of finger hand - 4 digits - width of palm cubit - 6 palms - elbow to fingertip span - width of outstretched hand fathom - fingertip to fingertip - outstretched arms inch - knuckle of thumb - tip to joint 3 well dried barleycorns - end to end yard - nose to fingertip	
	The mile was originally determined as 2,000 paces of Roman soldiers.	
	Later it became 5,280 feet, established by Queen Elizabeth I.	
	The United States uses the English measuring system: ounce, foot, pint, pound, quart, yard, mile.	
	The English system was established in the 17th century.	View transparencies: "Metric Clocks Off Time"
	The metric system was established in France in the 17th century.	
	Adoption of the metric system was slow, but occurred steadily in other nations.	
	In 1866, the metric system was made lawful in the United States but was not adopted as the system of measurement.	

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
	In 1875, the Treaty of the Metre was signed by industrial countries, affirmed by the U.S. as our system of measures.	
	In 1960, the Modernized International System of Units (SI) was adopted, but not by the U.S. as our system of measures.	
	In 1965, England began the conversion to the metric system (metrication).	
	In 1968, the U.S. Congress passed the Metric Study Act.	
	The U.S. Metric Study was reported to Congress in 1971, at which time several recommendations were made.	
	Currently, the United States is the only major nation not operating on the metric system.	"Our Metric World 1976" Transparency.
	Although the U.S. has still not adopted the metric system, on Dec. 23, 1975, President Gerald Ford signed the Metric Conversion Act of 1975 (Public Law 94-168).	
recall that some U.S. industries have been using metric measurements	The metric system has been used in medicine, photography, sports, and dietetics.	Transparency indicating common metric usage in U.S. to date.
	We will soon be moving entirely into the metric system of measurement.	

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
indicate an awareness of problems that may be encountered in a change to the metric system by identifying each of 10 statements as an advantage or disadvantage with 80% accuracy	Advantages: 1. a universal system - stimulate sales and balance exports with imports 2. easier to use - decimal system 3. calculations are faster 4. less chance of error 5. interchange of machine parts 6. standard tools 7. time saving 8. interrelationship of units Disadvantages: 1. reluctance to change 2. expense 3. re-education 4. transition will take time	Brainstorm - compile list of advantages and disadvantages of metric conversion using chalkboard or flannelboard. Discuss each as they are listed. Identify "Advantages and Disadvantages" of metric conversion.
orally differentiate between the customary and the metric systems of measurement	Customary: Units vary when same substance is measured Fractions used Abbreviations used Metric: Based on units of 10 Prefixes change amount of metre, litre, gram Symbols - no abbreviations Decimals - no fractions No commas in large numbers - space difference	View transparency: "Base units and symbols". (discussed in next lesson). Assignment: collect pictures, articles, food wrappers, advertisements, etc. which indicate use of metrics (to be used in bulletin board). Take home NBS leaflet "All You Will Need to Know About Metric".

ARE YOU READY FOR THE METRIC SYSTEM?

Fill in the blanks with your answers:

1. 16 tablespoons = _____ cup(s)
2. 4 ounces = _____ gill(s)
3. 1 ounce = _____ tablespoon(s)
4. 16 ounces = _____ pound(s)
5. 32 ounces = _____ quart(s)
6. 1 peck = _____ quart(s)
7. 4 pecks = _____ bushel(s)
8. 1 bushel = _____ quart(s)
9. 105 quarts = _____ barrel(s)
10. 1 cord = _____ cubic foot/feet
11. _____ cubic foot/feet = 1 cubic yard
12. 1 dram = _____ grain(s)
13. 1 ton = _____ pound(s)
14. 12 inches = _____ foot/feet
15. 1 hogshead = _____ barrel(s)
16. _____ yards = 1 mile
17. _____ rods = 1 mile
18. 1 rod = _____ foot/feet
19. 18 feet = _____ fathom(s)
20. 80 rods = _____ furlong(s)

KEY: ARE YOU READY FOR THE METRIC SYSTEM?

1. 1 cup
2. 1 gill
3. 2 tablespoons
4. 1 pound
5. 1 quart
6. 8 quarts
7. 1 bushel
8. 32 quarts
9. 1 barrel
10. 128 cubic feet
11. 27 cubic feet
12. 24 grains
13. 2000 pounds
14. 1 foot
15. 2 barrels
16. 1760 yards
17. 320 rods
18. 16 1/2 feet
19. 3 fathoms
20. 2 furlongs

SCORING:

16 - 20 correct: GREAT! But . . . you better get with it.
METRICS IS COMING!

11 - 15 correct: SO SO. You haven't a lot to forget!

0 - 10 correct: You'll just love the metric system!

CUSTOMARY

fathom

Barrel ROD

gal. ounce

cup

FURLONG

yd. cord grain QT.

Cubit ton bushel

SPAN

foot dram pt.

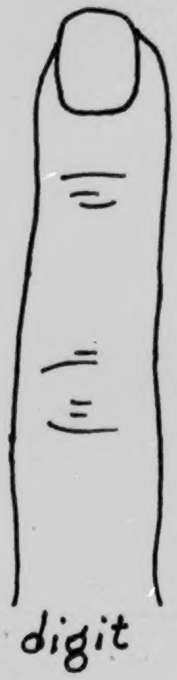
fl. oz.

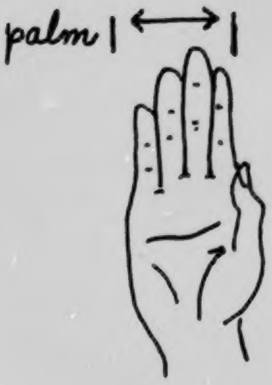
lb. MILE gill inch

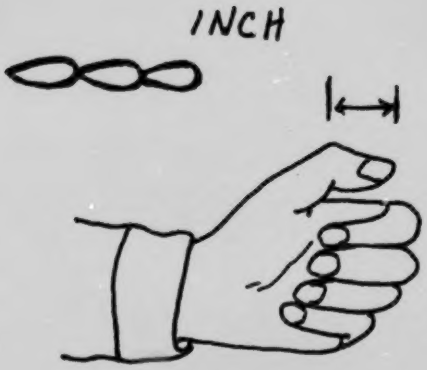
peck

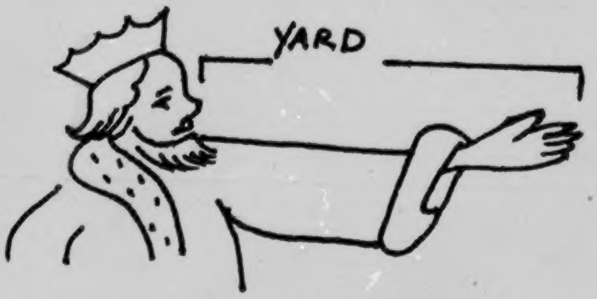
METRIC

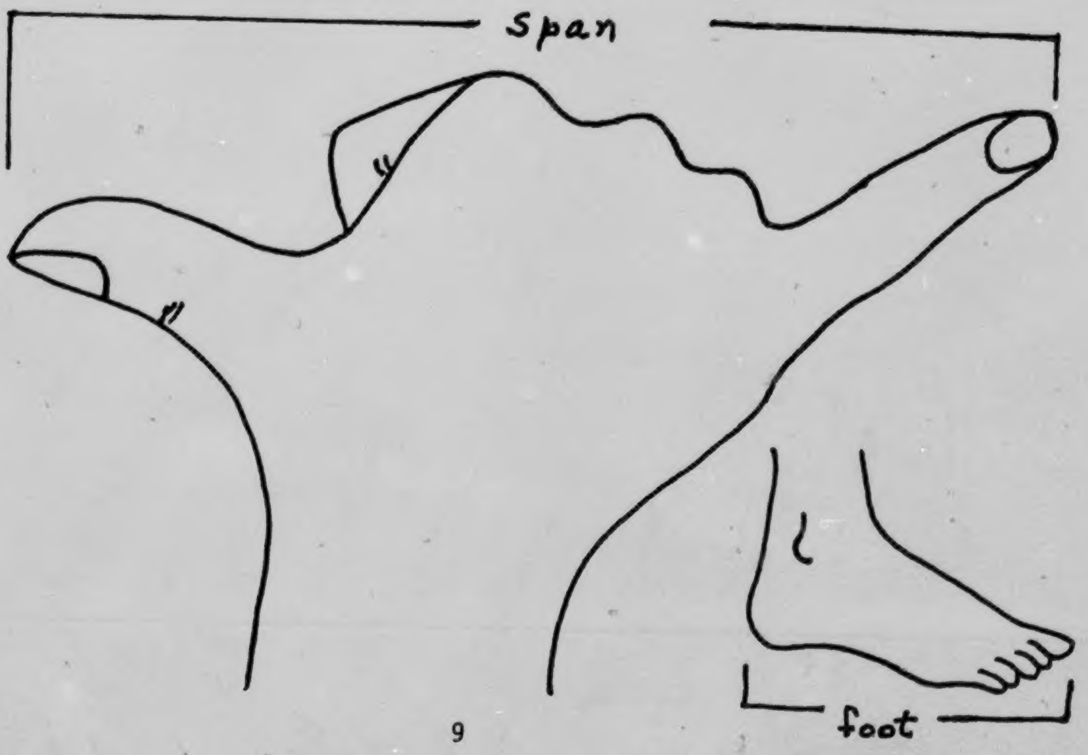
metre litre gram

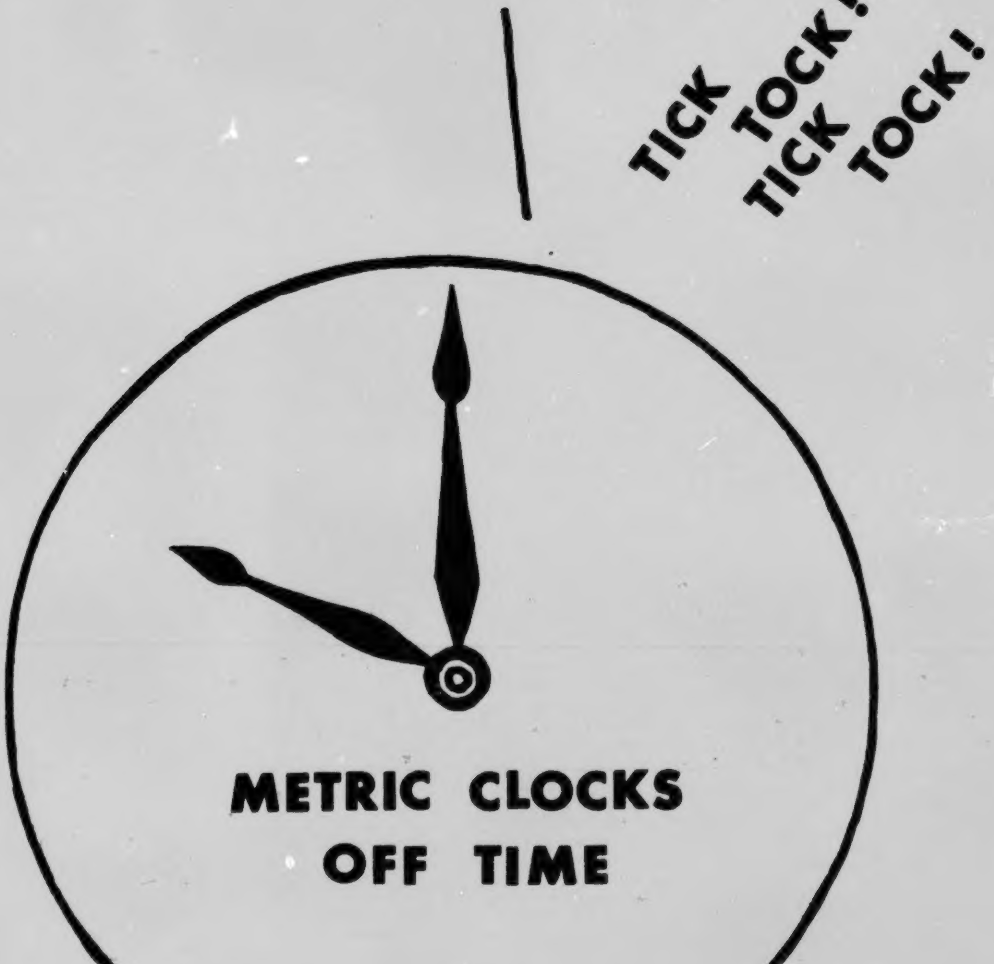

digit

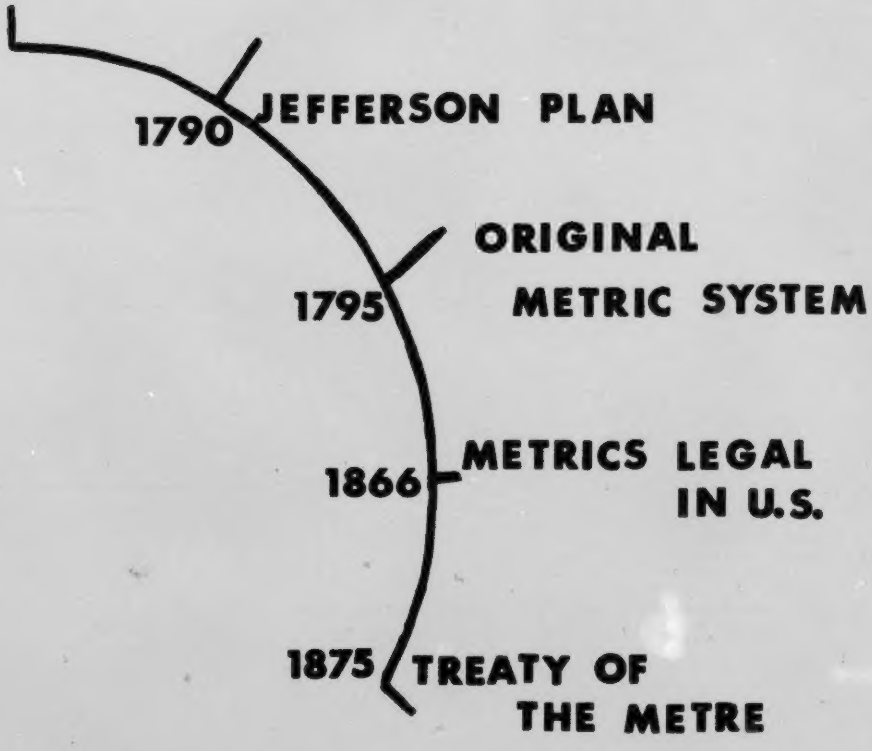

palm


INCH


YARD


Span
foot


TICK TOCK !!
TICK TOCK !
METRIC CLOCKS
OFF TIME



1790 JEFFERSON PLAN

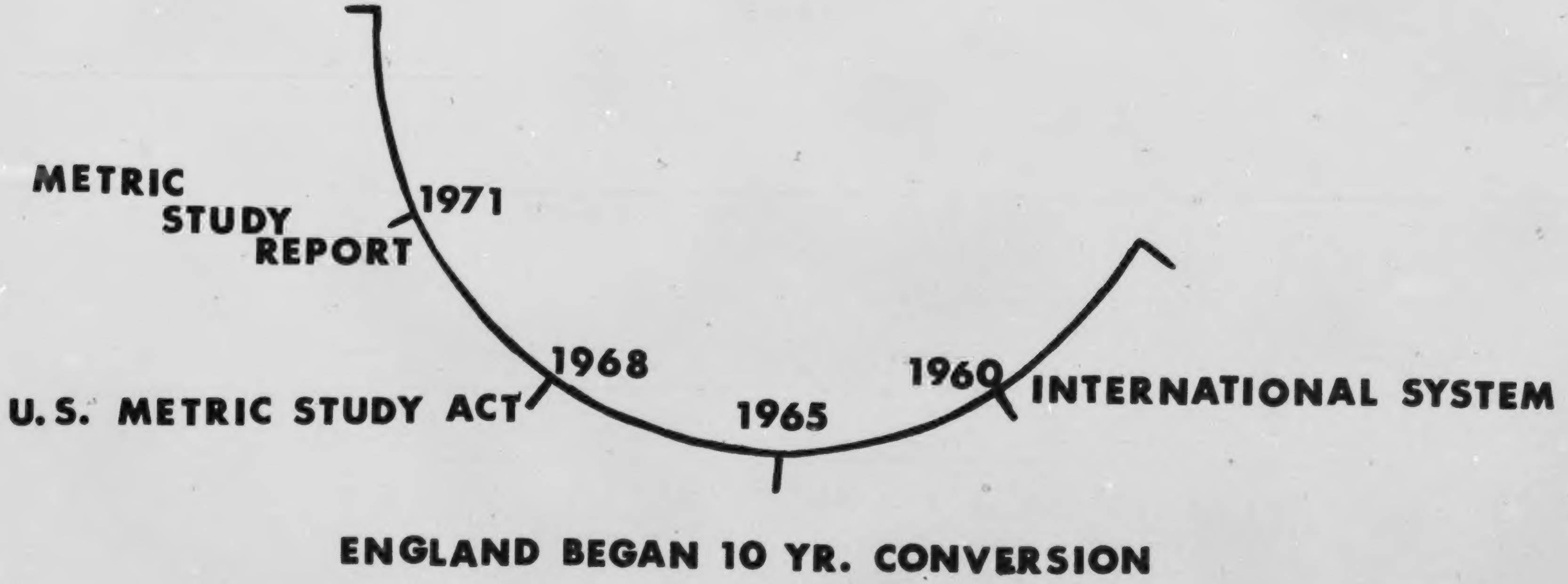
1795 ORIGINAL METRIC SYSTEM

1866 METRICS LEGAL IN U.S.

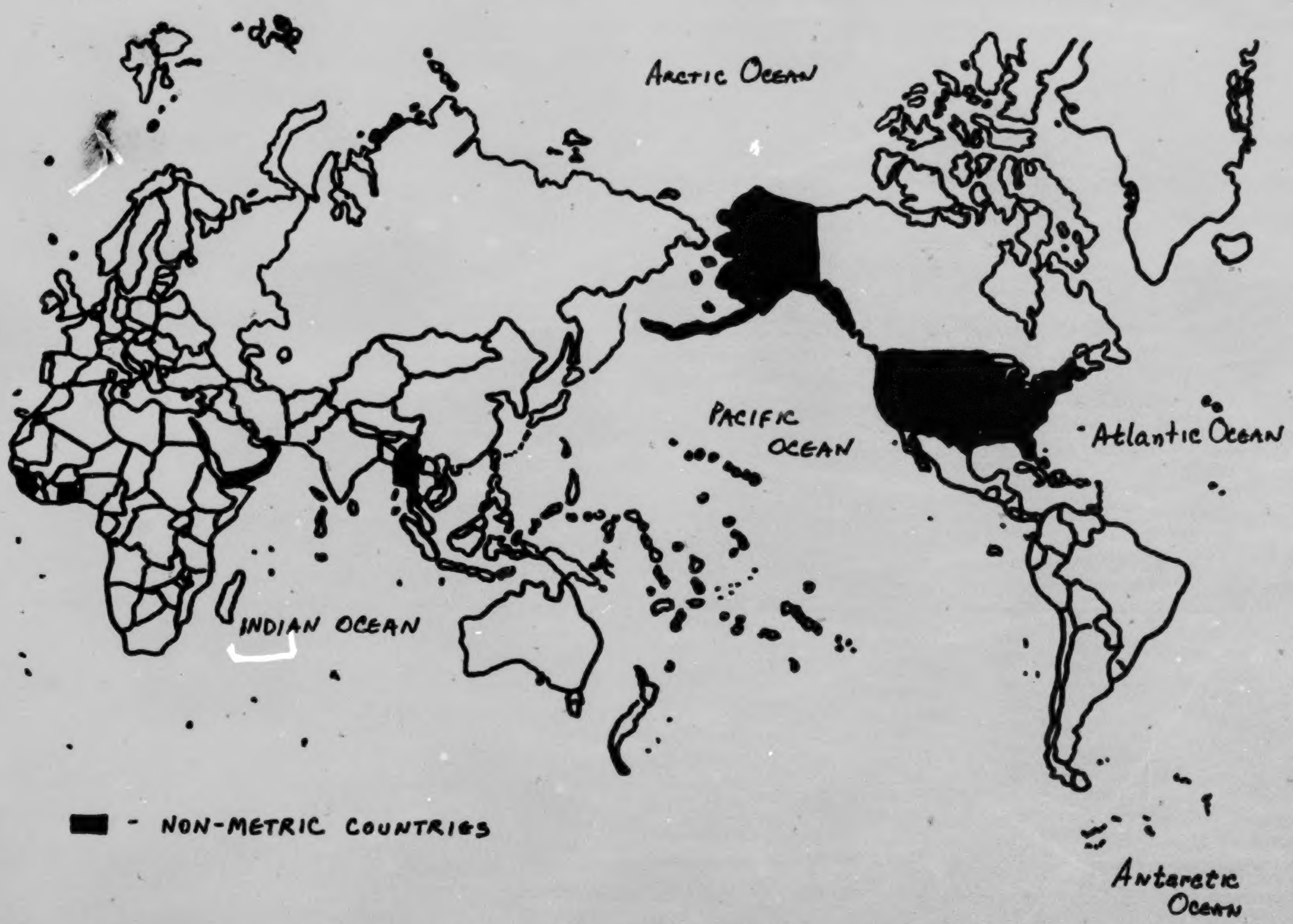
1875 TREATY OF THE METRE

Overlay No. 1

Overlay No. 2


METRIC
STUDY
REPORT
1971
1968
U.S. METRIC STUDY ACT
1965
ENGLAND BEGAN 10 YR. CONVERSION
1960
INTERNATIONAL SYSTEM

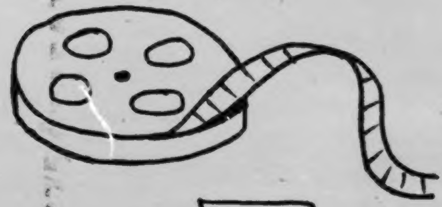
OUR METRIC WORLD 1976


Arctic Ocean
Pacific Ocean
Atlantic Ocean
Indian Ocean
Antarctic Ocean
■ - NON-METRIC COUNTRIES

METRIC USAGE IN THE U.S.

8 mm

16 mm



35 mm

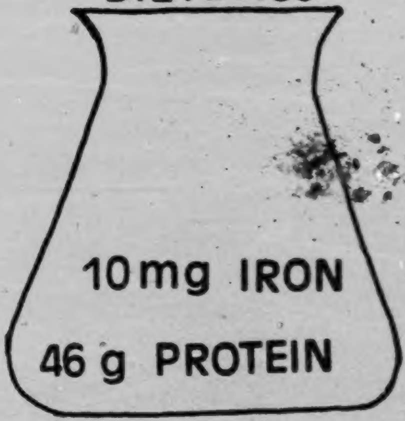
100 WATT BULB

SPORTS

100 m swim

200 m dash

DIETETICS



10mg IRON

46 g PROTEIN

SEVEN BASE UNITS

		SYMBOL
metre	length	m
kilogram	mass	kg
second	time	s
ampere	electric current	A
kelvin	temperature	K
candela	luminous intensity	cd
mole	amount of substance	mol

ADVANTAGE OR DISADVANTAGE ?

Identify each of the following ten statements as an advantage (A) or a disadvantage (D) of conversion to the metric system.

___ 1. The measurement system now in use in the U.S. has many base units.
___ 2. The U.S. could increase the amount of trade with foreign countries.
___ 3. The metric system is based on units of ten.
___ 4. Metrication could be costly.
___ 5. People tend to resist change.
___ 6. THINKING METRIC will take re-education.
___ 7. Each base unit may be made larger by adding prefixes.
___ 8. Metrication could take many years to complete.
___ 9. Metrication may create confusion.
___10. The metric system is already in use in certain areas in the United States.

All You Will Need to Know About Metric

(For Your Everyday Life)

10

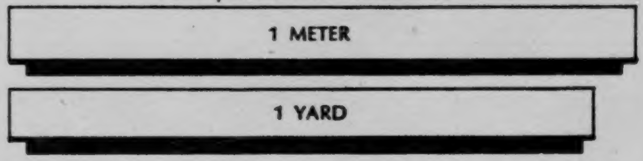
Metric is based on Decimal system

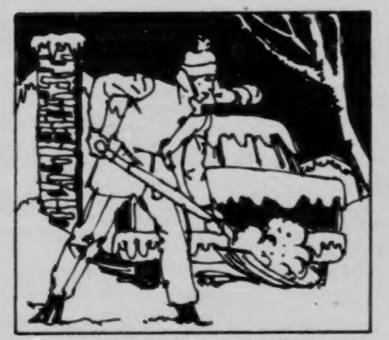
The metric system is simple to learn. For use in your everyday life you will need to know only ten units. You will also need to get used to a few new temperatures. Of course, there are other units which most persons will not need to learn. There are even some metric units with which you are already familiar: those for time and electricity are the same as you use now.

BASIC UNITS

METER: a little longer than a yard (about 1.1 yards)
LITER: a little larger than a quart (about 1.06 quarts)
GRAM: about the weight of a paper clip

(comparative sizes are shown)



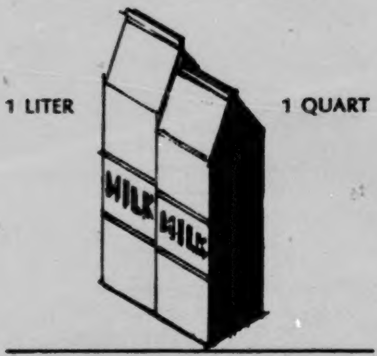


25 DEGREES FAHRENHEIT

COMMON PREFIXES
(to be used with basic units)

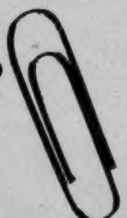
Milli: one-thousandth (0.001)
Centi: one-hundredth (0.01)
Kilo: one-thousand times (1000)

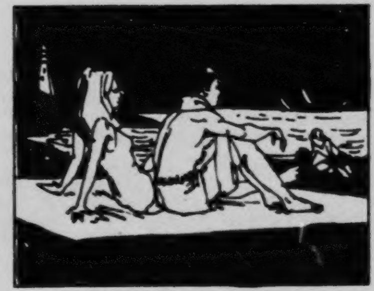
For example:
1000 millimeters = 1 meter
100 centimeters = 1 meter
1000 meters = 1 kilometer



OTHER COMMONLY USED UNITS

Millimeter:	0.001 meter	diameter of paper clip wire
Centimeter:	0.01 meter	width of a paper clip (about 0.4 inch)
Kilometer:	1000 meters	somewhat further than ½ mile (about 0.6 mile)
Kilogram:	1000 grams	a little more than 2 pounds (about 2.2 pounds)
Milliliter:	0.001 liter	five of them make a teaspoon

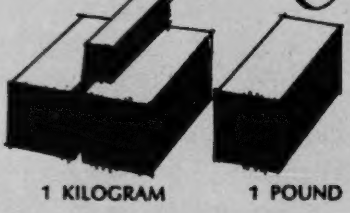




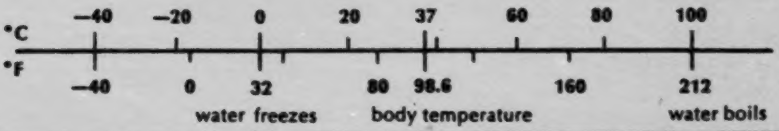
25 DEGREES CELSIUS

OTHER USEFUL UNITS

Hectare: about 2½ acres
Tonne: about one ton



TEMPERATURE
degrees Celsius are used



For more information, write to: Metric Information Office, National Bureau of Standards
Washington, D.C. 20234

Unit II

CONCEPTS: The International System of Units (SI)
THINKING METRIC

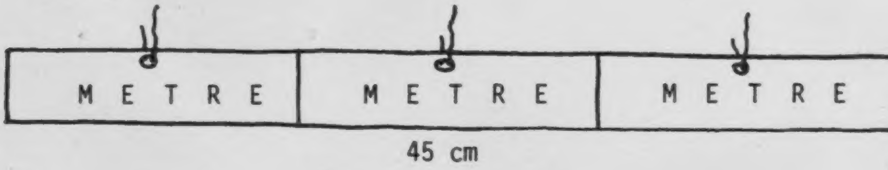
OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After participating in classroom activities the student will be able to:	Metric measurements are organized in a simple logical decimalized system. The modernized form of the metric system (SI) is known as the International System of Units (Systeme International d' Unites).	"Introduction to Metrics" (Transparency presentation in Appendix).
identify the 7 base units and their symbols		Review transparencies on the 7 base units and symbols from previous lesson.
	There are 7 base units: length metre (m) mass kilogram (kg) time second (s) electric current ampere (A) temperature kelvin (K) substance mole (mol) luminous intensity candela (cd) We use symbols, not abbreviations, so no periods are used. Symbols are the same in every language.	Reinforce and supplement learnings with charts such as The Metric System (NBS).

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
list the units with which the consumer will deal most frequently	The four most common units with which consumers will deal are: metre (39.4 in.) litre (1.06 qt.) kilogram (2.2 lb.) degrees Celsius (°Fahrenheit)	"Common Metric Terms and Symbols" transparency.
identify the most commonly used prefixes by name and indicate their values	Prefixes used with units indicate the division or multiple of ten. The most common prefixes and their symbols are: milli (m) - 1/10000 or 0.001 centi (c) - 1/100 or 0.01 deci (d) - 1/10 or 0.1 deka (da) - 10 X hecto (h) - 100 X kilo (k) - 1000 X	Flash cards with units, prefixes, symbols and values. Mobile "Metre, Litre, Kilogram". Review exercise "Prefixes and Symbols".
discover the relationship of the prefixes with the basic units	Unlike the U.S. customary system, the metric system requires no conversion from unit to unit, except for moving the decimal point.	"Metric Fun 'n' Games" to complete at home.
compare the metric system to our monetary system	Metric units for any given physical quantity relate to each other in a manner similar to our monetary system.	Compare to dollar: Transparency "If a dollar equalled a metre".
identify and apply in future lessons the basic rules for writing metrics in accepted SI usage	-All English speaking nations are officially using the metre and litre form of spelling. -All symbols are written in lower case except for those named after a person: metre m Celsius C ampere A kelvin K	Using chalkboard practice writing metric terms.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
	-These are symbols, not abbreviations, therefore no periods are used. -Leave a space between the numeral and the symbol except in writing temperature. 20 cm 20°C -Do not use "s" with symbol to indicate plural. The number itself indicates that it is plural. 20 cm -Groups of three digits above and below the decimal are separated by a space - no comma. 1 000 -For a numerical value less than one a zero precedes the decimal. 0.5	
THINK METRIC by citing actual present day use of metrics in the U.S.	90 km/hr gas 13¢ per litre warm weather 25°C fever 39°C fabric by the metre zippers by the centimetre body measurements & patterns 87-65-92 weight kg Measurements of money, electricity, time will be the same.	Bulletin board "Think Metric - Whooo Me?" Students create a bulletin board of clippings, labels, news items, etc. "Metri-cross". "Metric Scramble".
pass a written test on the unit with at least 70% accuracy		Test on units, symbols and prefixes.

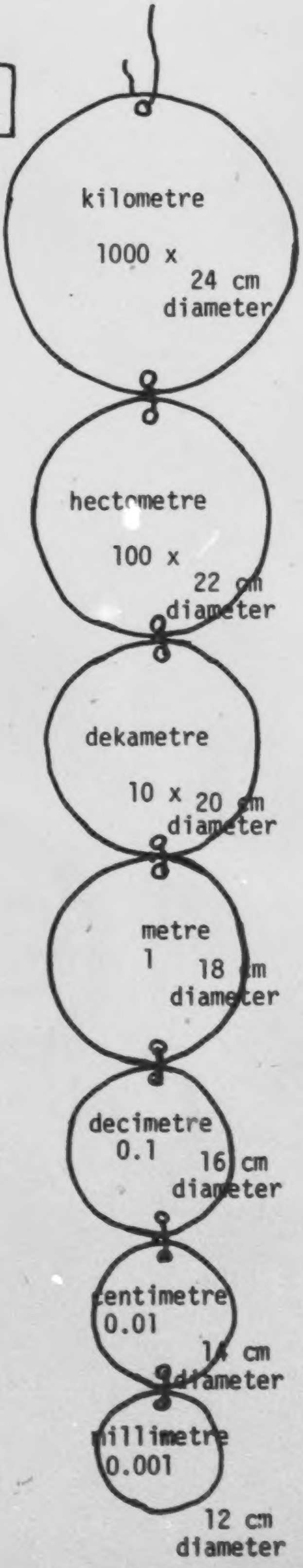
METRE, LITRE, GRAM MOBILE

Given below is an example of the metre. The mobile is made up of all three units of measure. Use the construction directions for the litre and gram.

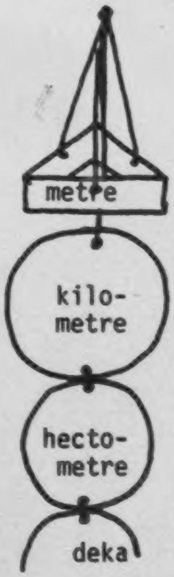

M E T R E
M E T R E
M E T R E
45 cm

DIRECTIONS:

1. Fold an 8 cm x 45 cm strip of heavy-weight cardboard into three parts, forming a triangle. Tape inside to hold securely.
2. String yarn through center of each side, leaving yarn long enough to reach classroom ceiling.
3. Make 7 discs (24 cm, 22 cm, 20 cm, 18 cm, 16 cm, 14 cm, 12 cm respectively) out of light-weight cardboard.
4. Label units and prefixes with magic marker.
5. Tie discs together with yarn.
6. "Kilo" disc will have long piece of yarn to reach classroom ceiling, joining on to triangle yarns at ceiling.
7. Note the finished sample.
8. Repeat the same steps for the remaining metric units.
9. Bright colors are eye-catching!


kilometre
1000 x
24 cm diameter
hectometre
100 x
22 cm diameter
dekametre
10 x
20 cm diameter
metre
1
18 cm diameter
decimetre
0.1
16 cm diameter
centimetre
0.01
14 cm diameter
millimetre
0.001
12 cm diameter

Completed Mobile


metre
kilo-metre
hecto-metre
deka

COMMON METRIC TERMS and SYMBOLS

QUANTITY	PREFIX	SYMBOL	LENGTH	VOLUME	MASS (WEIGHT)
X 1 000	kilo	k	kilometre	*	kilogram
X 100	hecto	h	*	*	*
X 10	deka	da	*	*	*
			metre (m)	**litre (ℓ)**	**gram (g)**
÷ 10 (0.1)	deci	d	*	*	*
÷ 100 (0.01)	centi	c	centimetre	*	*
÷ 1 000 (0.001)	milli	m	millimetre	millilitre	milligram

*not commonly used

PREFIXES and SYMBOLS

Write the metric prefixes and symbols in the spaces provided.

		PREFIX	SYMBOL
1000	thousands	_____	_____
100	hundreds	_____	_____
10	tens	_____	_____
1	ones	_____	_____
1/10	tenths	_____	_____
1/100	hundredths	_____	_____
1/1000	thousandths	_____	_____

METRIC FUN 'N' GAMES

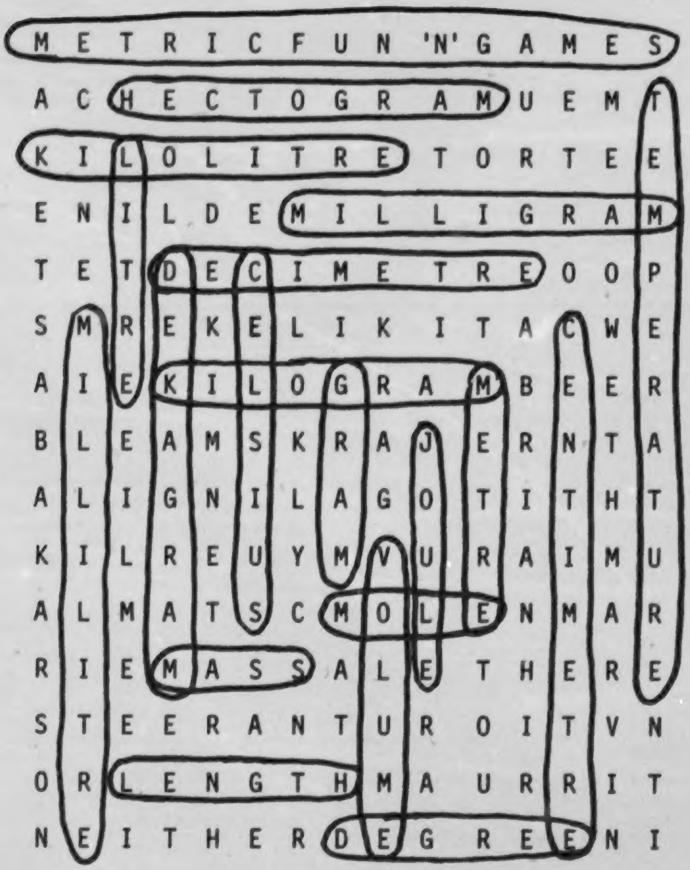
M	E	T	R	I	C	F	U	N	'N'	G	A	M	E	S
A	C	H	E	C	T	O	G	R	A	M	U	E	M	T
K	I	L	O	L	I	T	R	E	T	O	R	T	E	E
E	N	I	L	D	E	M	I	L	L	I	G	R	A	M
T	E	T	D	E	C	I	M	E	T	R	E	O	O	P
S	M	R	E	K	E	L	I	K	I	T	A	C	W	E
A	I	E	K	I	L	O	G	R	A	M	B	E	E	R
B	L	E	A	M	S	K	R	A	J	E	R	N	T	A
A	L	I	G	M	I	L	A	G	O	T	I	T	H	T
K	I	L	R	E	U	Y	M	V	U	R	A	I	M	U
A	L	M	A	T	S	C	M	O	L	E	N	M	A	R
R	I	E	M	A	S	S	A	L	E	T	H	E	R	E
S	T	E	E	R	A	N	T	U	R	O	I	T	V	N
O	R	L	E	N	G	T	H	M	A	U	R	R	I	T
N	E	I	T	H	E	R	D	E	G	R	E	E	N	I

Can you locate all twenty (20) hidden words pertaining to the metric system?

metric fun 'n' games
hectogram
milligram
centimetre
kilogram
Celsius
metre
litre
gram
joule

decimetre
dekagram
kilolitre
millilitre
length
mass
volume
degree
temperature
mole

KEY: METRIC FUN 'N' GAMES



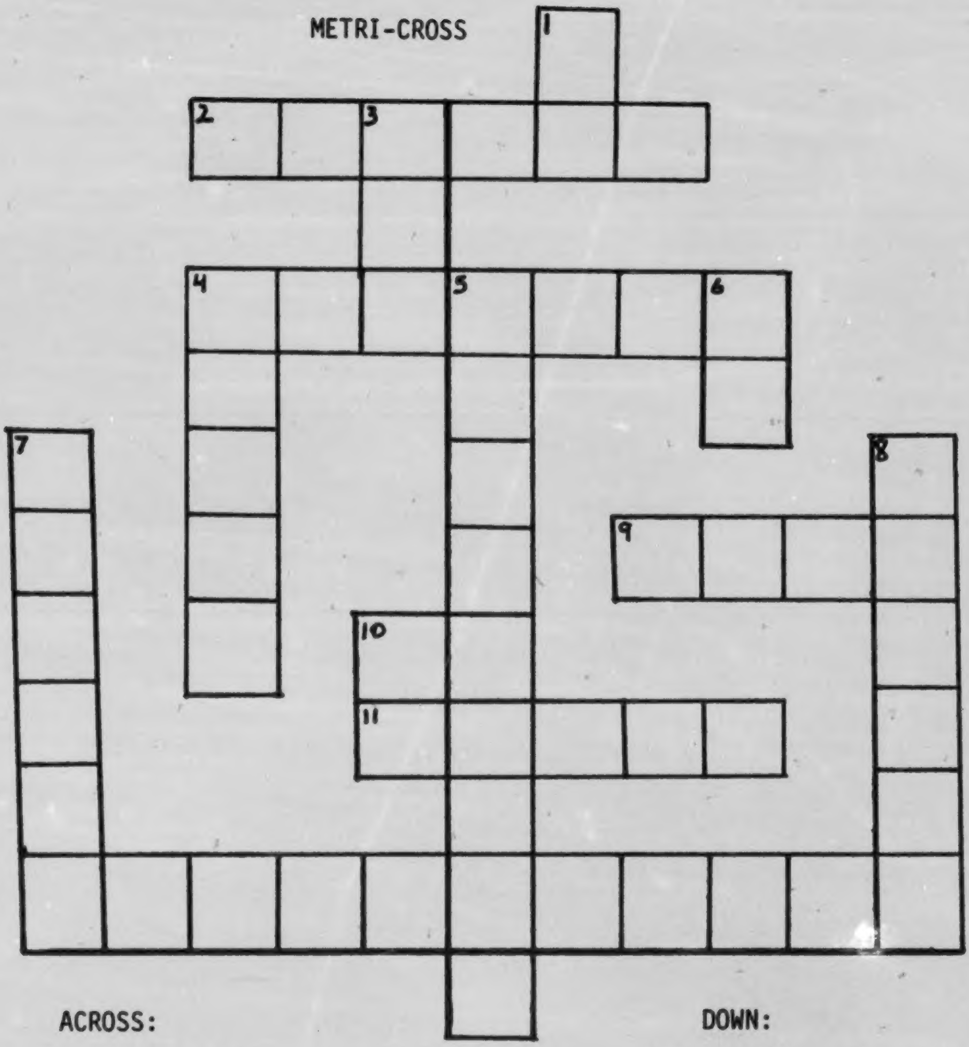
M E T R I C F U N 'N' G A M E S
A C H E C T O G R A M U E M T
K I L O L I T R E T O R T E E
E N I L D E M I L L I G R A M
T E T D E C I M E T R E O O P
S M R E K E L I K I T A C W E
A I E K I L O G R A M B E E R
B L E A M S K R A J E R N T A
A L I G N I L A G O T I T H T
K I L R E U Y M V U R A I M U
A L M A T S C M O L E N M A R
R I E M A S S A L E T H E R E
S T E E R A N T U R O I T V N
O R L E N G T H M A U R R I T
N E I T H E R D E G R E E N I

Can you locate all twenty (20) hidden words pertaining to the metric system.

metric fun 'n' games
hectogram
milligram
centimetre
kilogram
Celsius
metre
litre
gram
joule

decimetre
dekagram
kilolitre
millilitre
length
mass
volume
degree
temperature
mole

METRI-CROSS



ACROSS:

2. The system of measure you are learning
4. Number of centimetres in a metre
9. Prefix meaning times 1 000
10. Symbol for millimetre
11. Base unit for length
12. °Celsius replaces °Fahrenheit for ___

DOWN:

1. Abbreviation for Systeme International
3. Metric is based on multiples of ___
4. Prefix meaning X 100
5. 1/10 of a metre
6. Symbol for deka-
7. The gram replaces our system for measuring ___
8. The litre measures ___
10. Symbol for millimetre

KEY

Across

2. metric
4. hundred
9. kilo
10. mm
11. metre
12. temperature

Down

1. SI
3. ten
4. hecto
5. decimetre
6. da
7. weight
8. volume
10. mm

METRIC SCRAMBLE

The following scrambled words are metric terms. Unscramble them and arrange the circled letters to form the answers to the following sentence.

TWO METRIC TERMS THAT ARE USED FREQUENTLY TODAY ARE

and

GOOD LUCK! G O O D L U C K

(No need to unscramble this one!)

SASM

MARG

CEID

TREEM

LERTI

NITCE

CETOH

TERCIM

REASUME

SUICELS

Key: Mass, Gram, Deci, Metre, Litre, Centi, Hecto, Metric, Measure, Celsius. CENTIMETRE and GRAM.

Unit III

CONCEPTS: The METRE as a measure of length and area
Decimal system

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After participating in classroom activities, the student will be able to:	The metric base unit for length is the metre. One metre is slightly longer than a yard.	"Metre pre test". Review and discuss pertinent transparencies.
identify units of the metre, using proper terms and symbols with 100% accuracy	m is the symbol for metre. The measures that we presently use for length will be replaced by the metre: foot, inch, mile, yard, hand, cubit, fathom, furlong. The denominations in practical use, with their symbols and values are: *kilometre km 1000 X hectometre hm 100 X dekametre dam 10 X *decimetre dm 0.1 *centimetre cm 0.01 *millimetre mm 0.001	Using an enlarged poster board metre ruler, illustrate the metre units (each in a different color). Compare them to the customary ruler and yard stick.
demonstrate the relationship between units of the metre	10 mm = 1 cm 10 cm = 1 dm 10 dm = 1 m 100 cm= 1 m 1000 km= 1 km	Use a metric rule to draw designated line segments.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
		Divide the class into small groups. Each group is given a metre stick, 20 decimetre sticks, 20 centimetre blocks and paper clips. Each group is to experiment with these materials and answer the questions asked on an accompanying worksheet. The teacher goes over the answers to the worksheet questions with each group as they finish. See: "Metre Worksheet".
	One inch = 2.54 cm Longer distances will be measured in kilometres. One km = app. 2/3 mile 55 mph = 88 km/hr	"Kilometre Activity Sheet".
construct and use simple metric measuring devices	Constructing and using metric measures assists one in THINKING METRIC.	"Metric Measures". Students construct metre stick and/or tape measure.
use personal reference measures to estimate metric lengths	The body may be used as a device for estimating metric lengths. Estimating helps one THINK METRIC, thus facilitating the transition to the metric system.	Compare metric lengths by observation and physical comparison. Complete "Body Metrics" worksheet. See: "Practice in Estimation" and
recognize distances that approximate 1 mm, 1 cm, 1 m	Recognizing metric distances is achieved through the practice of taking distance measurements.	Practice with small measures. Working individually, follow directions on "Metric Dot".

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
develop the concept of area by differentiating among cm, cm^2 and cm^3	Area (ℓ x w) is the amount of surface space.	
	Area uses the length measurements expressed in mm^2 square millimetres cm^2 square centimetres m^2 square metres km^2 square kilometres Hectare = 10 000 square metres (m^2) Farm land is measured in hectares.	Determine own hand area in square centimetres using a grid (Appendix). Estimate, measure and calculate area of given space (ex: dining room for wallpaper, bathroom floor for tile). See: "Area Exercise". Determine area of given geometric figures.
	Volume (ℓ x w x h) is the amount of space occupied by a quantity of matter.	
	Volume and capacity use length measurements expressed in: mm^3 cm^3 = mℓ = 1 g dm^3 = ℓ = 1 kg m^3 km^3	Scale drawing of bedroom floor plan for furniture. "Metric Area". See "Area Exercise" sheet.
	The exponents are written slightly raised from the symbol.	Measure the size of this page. Calculate its area in cm^2. Convert to mm^2, m^2.
develop skill in using the decimal system by converting from one metric unit to another with 100% accuracy	Converting to other units of the metre can be done quicker and more simply than with the customary system. When decimal is moved to the left, the value becomes a smaller part of the base unit.	Practice movement of decimal to arrive at a different prefix for a metric base unit. "Metric Length Exercise".

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
	When decimal is moved to the right, the number becomes a larger part of the base unit.	Quiz: "Metric Length". "Metre Quiz". Play: "Metre Maid". "Metric Milly".
respond accurately to given problem in linear measure	Practice in estimation, followed with verification by actual measurement, is a good way to learn to THINK METRIC.	Select a card on which is written a question of length to be estimated in the presence of the teacher, actually measured, recorded and converted to both a larger and smaller unit. See: "Twenty Measurement Problems". Actual measurement should be accurate to within the nearest cm and the conversion 100% correct. "Metre Post Test".

METRE PRETEST

You will not be graded on this test. It is not expected that you know these answers now. Thinking about the questions now will introduce you to some basic concepts and help you to recognize the important ideas as they appear in our studies.

DO NOT WRITE ON THIS SHEET. Write the letter indicating the correct answer for each statement on the response sheet.

1. The metre is a measure of
   a) weight b) length c) volume d) time
2. A metre equals 100
   a) kl b) mm c) km d) cm
3. The correct symbol for the metre is
   a) m b) M c) m. d) mm
4. The prefix centi means
   a) 100 b) 10 c) 1/10 d) 1/100
5. Which of the following lines appears to be equal to 2 cm?
   a)____________ b)___ c)________ d)________________
6. The smallest of the following units is
   a) centimetre b) millimetre c) metre d) kilometre
7. The largest of the following units is
   a) centimetre b) millimetre c) metre d) kilometre
8. In place of inches, what metric unit will be used to measure similar distances?
   a) centimetre b) litre c) metre d) kilometre
9. A basketball player would be approximately how tall?
   a) 10 centimetres b) 1 metre c) 2 metres d) 2 kilometres
10. The length of a new pencil would be approximately
    a) 8 millimetres b) 8 kilometres c) 18 centilitres
    d) 18 centimetres

KEY:	1.	B	6.	B
	2.	D	7.	D
	3.	A	8.	A
	4.	D	9.	B
	5.	C	10.	D

Metre Worksheet

Using the materials supplied by the teacher, perform the following activities and answer the accompanying questions.

Which do you think is longer, a yard or a metre?

a) Using a yard stick, measure the metre stick. ___ inches.

b) The length of a yard stick is ___ inches.

The difference between measurements a and b is ___ inches, therefore the metre (m) is longer than a yard. 1 m = 1.1 yds.

How many decimetres would it take to equal one metre? ___

How many centimetres would it take to equal a decimetre? ___

If the diameter of the wire of a paperclip is equal to one millimetre (0.001 m), how many millimetres are equal to one centimetre? ___

How many centimetres does it take to make one metre? ___

How many millimetres does it take to make one metre? ___

1 metre = ____ decimetres
____ centimetres
____ millimetres

Among the following terms, what is the base unit: millimetre, centimetre, decimetre. _______

Metre is the metric unit used to measure (select one): a) volume, b) mass, c) length, d) temperature. ____________

Milli, centi, and deci are common prefixes used with all metric base units that are smaller than the base unit itself.

The prefix milli means thousandth therefore 1 mm = 0.001 m

centi means hundredth therefore 1 cm = _____ m

deci means tenth therefore 1 dm = _____ m

THINK METRIC !!

KILOMETRE ACTIVITY SHEET

Using the U.S. map attached, measure to the nearest centimetre the distance between the designated cities. Calculate the distance in kilometres. Scale : 1 cm = 100 km.

	CITIES	cm	km
1.	Los Angeles to St. Paul, Minnesota	______	______
2.	Butte, Montana to Miami, Florida	______	______
3.	Washington, D.C. to New Orleans	______	______
4.	Omaha, Nebraska to Chicago, Illinois	______	______
5.	Santa Fe, New Mexico to Raleigh, N.C.	______	______
6.	Reno, Nevada to New York City	______	______
7.	Seattle, Washington to Houston, Texas	______	______
8.	Tucson, Arizona to Memphis, Tennessee	______	______
9.	Denver, Colorado to Portland, Maine	______	______
10.	Tulsa, Oklahoma to Pittsburgh, Penna.	______	______

On the bulletin board is a map of the area of our town. Measure the distance to the following towns:

From Indiana, Pa., to

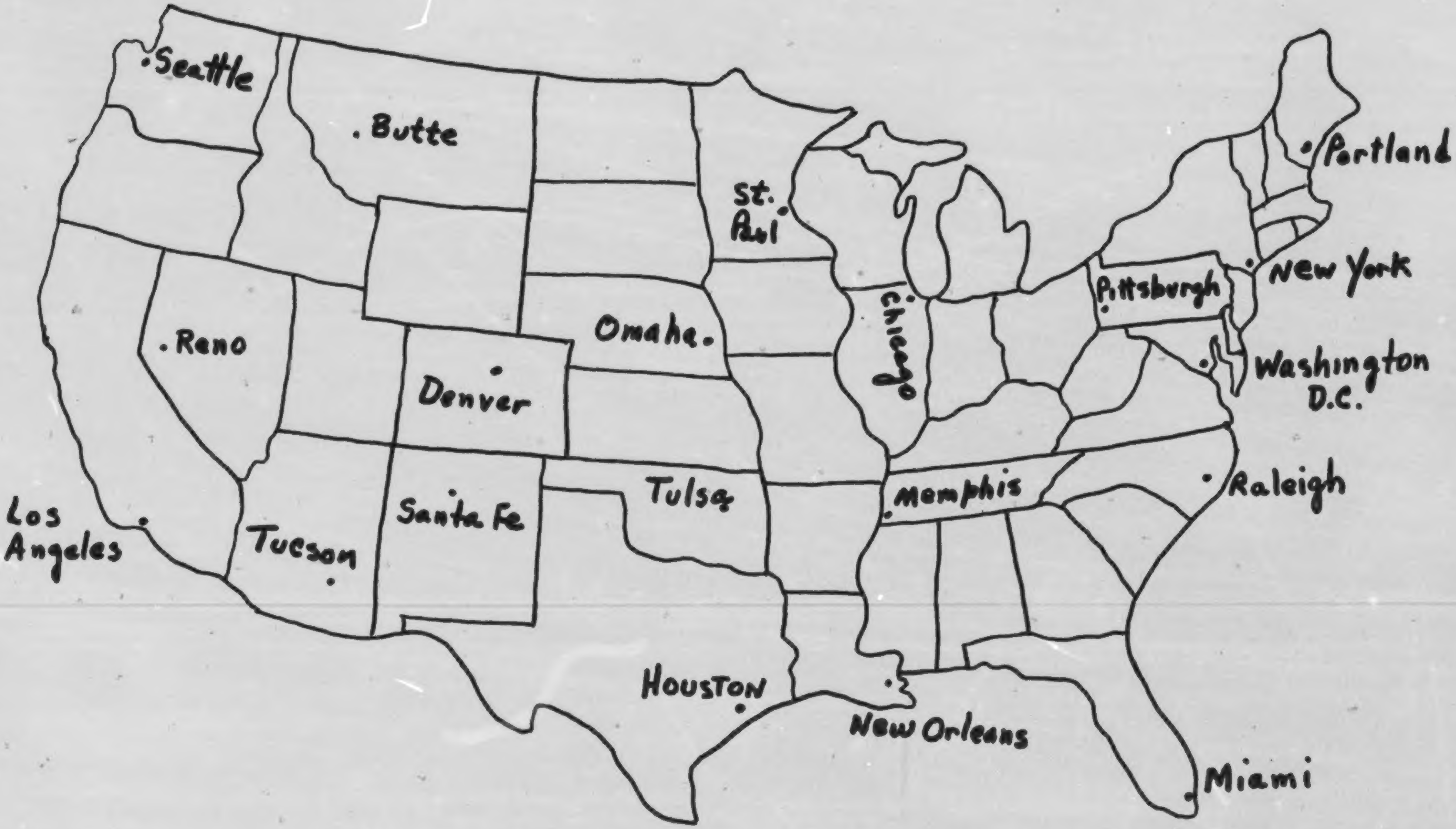
Homer City ___ km

Clymer ___ km

Plumville ___ km

Elderton ___ km

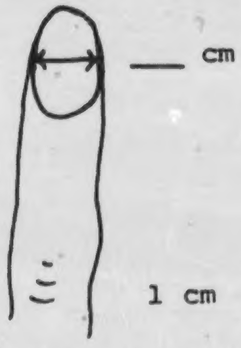
Blairsville ___ km


Seattle
Butte
Portland
St. Paul
New York
Pittsburgh
Chicago
Reno
Omaha
Washington D.C.
Denver
Raleigh
Tulsa
Memphis
Los Angeles
Santa Fe
Tucson
Houston
New Orleans
Miami

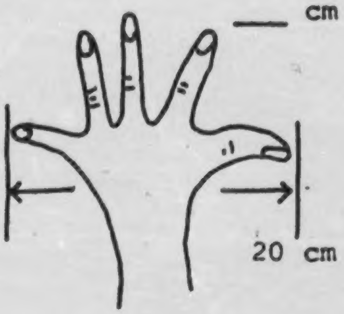
1 cm represents 100 km

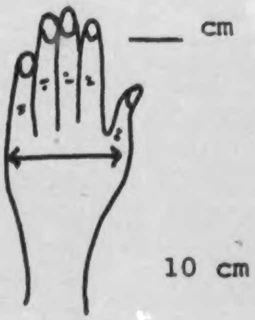
BODY METRICS

Using a metre measure, take the measurements of your left hand as indicated in the drawings below. Place your measurements for each in the space provided. Compare your body measurements with the listed averages for each.



little finger



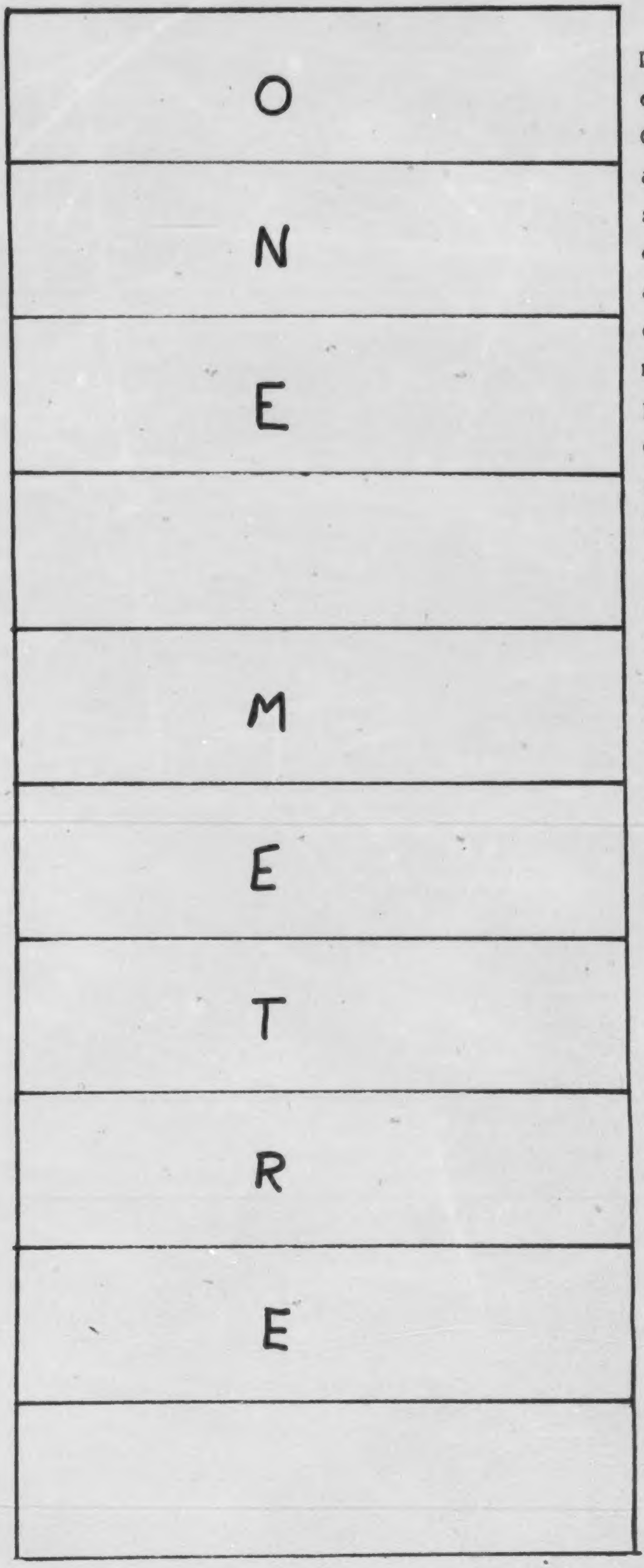


Estimate the lengths of the following items, using your body measurers. Place your estimates in the proper column.

Now, measure these items using a metre measure. Place the correct measurement in the second column.

HOW CLOSE IS YOUR BODY MEASURING ??

ITEM	BODY ESTIMATE	ACTUAL MEASUREMENT
1. Shears	___ cm	___ cm
2. Scissors	___ cm	___ cm
3. Button	___ cm	___ cm
4. Table	___ m	___ m
5. Straight pin	___ cm	___ cm
6. Elastic	___ cm	___ cm
7. Spool of thread	___ cm	___ cm
8. Hem gauge	___ cm	___ cm
9. Bolt of fabric	___ cm	___ cm
10. Bobbin	___ cm	___ cm



METRIC MEASURES

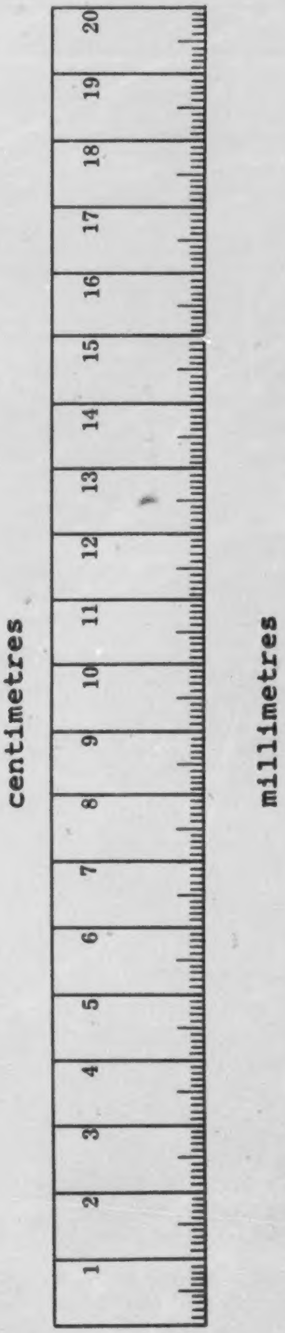
Duplicate this pattern on lightweight cardboard. Cut the ten sections apart carefully. Each section should measure one decimetre. Tape all ten sections together carefully to measure one metre. With a colored pencil or pen, mark each decimetre into ten equal sections, labeling each line 1, 2, 3 . . . up to 100. Each of these small sections is equal to one centimetre. Print your name on the back of your meter stick.

To make a folding metre tape, follow the above directions, using regular weight copy paper instead of cardboard. You may wish to reinforce your tape by laminating it or by backing it with tape, such as plastic tape, masking tape or coated tape.

HAPPY
METRIC
MEASURING!

METRIC MEASURE

This page may be duplicated. Cut out the 20 centimetre measure and glue to cardboard.

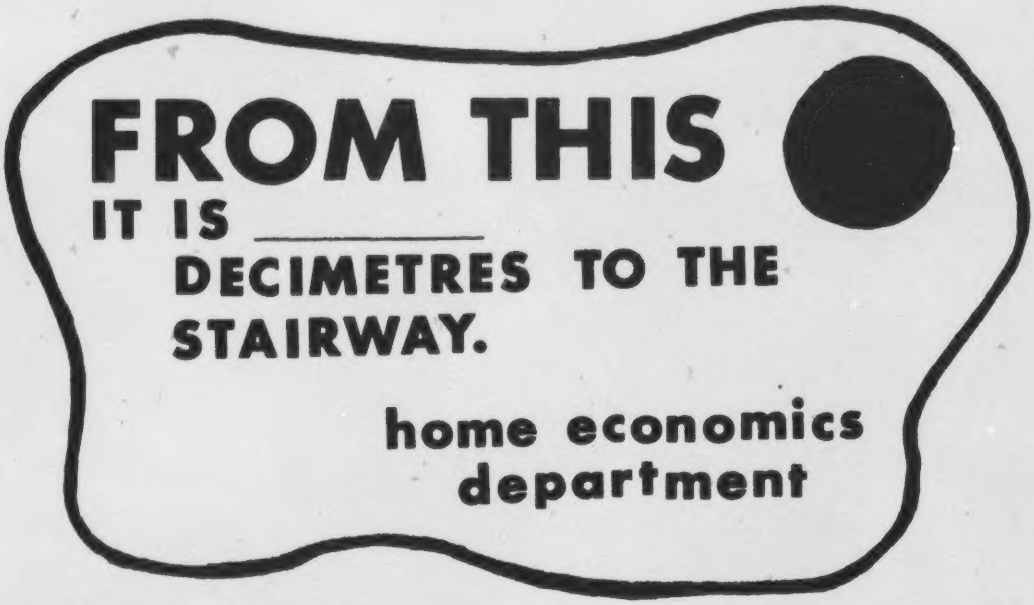

centimetres
millimetres
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

PRACTICE IN ESTIMATION

For the following list of items, first estimate the distances. Then make the actual measurement and convert to the larger or smaller measurement as indicated.

OBJECT	ESTIMATE	ACTUAL	OR
refrigerator (width)	___ cm	___ cm	___ mm
width of window	___ m	___ m	___ dm
length of island	___ m	___ m	___ cm
length of kitchen	___ m	___ m	___ km
width of kitchen	___ m	___ m	___ hm
height of gas range	___ cm	___ cm	___ dam

METRIC DOT



FROM THIS ●
IT IS ________
DECIMETRES TO THE
STAIRWAY.

home economics
department

METRIC DOTS are free-form shapes cut from cardboard. Use bright flourescent paper for the "dots".

OBJECT: Each student will receive one Metric Dot Card which reveals a place or thing in the school to which they are to calculate a distance measurement in the metric system.

DIRECTIONS:

1. After receiving a Metric Dot Card the student will take a metre stick and begin to measure from any desired spot in the school to the designated area shown on the card.

2. The person should then note the distance from the starting point to the designated area (in pencil).

3. Tape the Metric Dot Card on the wall at the original starting place.

   By completing this activity, the student has not only practiced using the metric system of measurement, but is also making other people in the school aware of the metric system of measuring length.

Sample cards might include:

From this ● it is _____
metres to the library.
metres to the gym.
centimetres to the floor.
metres to the office.
metres to the exhibit case.
metres to the cafeteria.

decimetres to the art room.
metres to the faculty room.
metres to the bottom of the steps.
centimetres to the water fountain.
decimetres to the metric bulletin board.
metres to the front entrance.

AREA EXERCISE

Determine the area of the floor of a room with the following dimensions:

	CUSTOMARY	METRIC
Length	14 ft. 6 in.	442 cm
Width	12 ft. 5 in.	379 cm

CALCULATIONS

Dimensions in inches

(14 x 12) + 6 = 174 in.

(12 x 12) + 5 = 149 in.

174 x 149 = 25,926 sq. in.

Divide by 144 to get sq. ft.
= 180 sq. ft. (app.)

Then divide by 9 for sq. yd.
= 20 sq. yd.

Dimensions in centimetres

442 x 379 = 167 600 cm^2

Total cm^2 divided by number of square centimetres in a square metre (10 000) equals number of square metres.

Just move decimal 4 places to the left.
= 17 square metres (app.)

METRIC AREA

On a table you find several rectangles and triangles. Find the perimeter (distance around) and the area (length x width) in centimetres.

	perimeter (cm)	area (cm^2)
A.		
B.		
C.		
D.		
E.		

METRIC LENGTH EXERCISE

Are the following measurements more, equal to, or less than each other? < means less than, = means equal to, and > means more than.

CIRCLE ONE

A.	1 millimetre	< = >	1 metre
B.	1000 millimetres	< = >	1 metre
C.	100 centimetres	< = >	1 metre
D.	10 metres	< = >	1 kilometre
E.	1000 metres	< = >	1 kilometre
F.	10 decimetres	< = >	1 metre
G.	500 metres	< = >	0.5 kilometre
H.	1 metre	< = >	0.01 kilometre
I.	100 metres	< = >	1 dekametre
J.	1 dekametre	< = >	10 metres
K.	100 metres	< = >	1 hectometre
L.	100 dekametres	< = >	1 kilometre
M.	10 dekametres	< = >	1 hectometre

KEY:

A. <
B. =
C. =
D. <
E. =
F. =
G. =
H. <
I. >
J. =
K. =
L. =
M. =

METRIC LENGTH

Write the missing prefix in the blank provided.

DECI HECTO CENTI MILLI DEKA KILO

A. 10 ______ metres = 1 metre.
B. 1 ______ metre = 1 000 metres.
C. 1 ______ metre = 10 millimetres.
D. 1 ______ metre = 100 metres.
E. 10 ______ metres = 1 kilometre.
F. 1 ______ metre = 10 metres.
G. 1 ______ metre = 10 dekametres.
H. 1 ______ metre = 10 centimetres.
I. 100 ______ metres = 1 metre.
J. 1000 ______ metres = 1 metre.

KEY:
A. deci
B. kilo
C. centi
D. hecto
E. hecto
F. deka
G. hecto
H. deci
I. centi
J. milli

METRE QUIZ

I. Circle the correct answer:

1. The metric unit of length is
   a) litre b) metre c) gram.
2. Which is longer?
   a) metre b) yard
3. Which is longer than a metre?
   a) millimetre b) kilometre c) decimetre
4. The smallest of the following is
   a) metre b) hectometre c) dekametre.
5. Which is smaller than a decimetre?
   a) hm b) dam c) cm
6. How many metres are there in one kilometre?
   a) 10 b) 100 c) 1000
7. How many millimetres are there in one decimetre?
   a) 10 b) 100 c) 1000

II. Arrange the following from largest to smallest by listing them in order in Column 2.

Column 1	Column 2
centimetre	
hectometre	
dekametre	
metre	
millimetre	
kilometre	
decimetre	

III. Match the prefix symbol with its respective amount.

Symbol	Amount
da	0.001
c	1000 x
d	0.1
h	10 x
m	100 x
k	0.01

Key to METRE QUIZ

I. 1. litre
2. metre
3. kilometre
4. dekametre
5. cm
6. 1000
7. 100

II. kilometre
hectometre
dekametre
metre
decimetre
centimetre
millimetre

III.

da	10 x
c	0.01
d	0.1
h	100 x
m	0.001
k	1000 x

TWENTY MEASUREMENT PROBLEMS

1. The distance from this spot to the water cooler is _____ metres.
2. The lower window pane is _____ cm wide.
3. It is _____ dm from this spot to the avocado range.
4. It is _____ dm from this spot to the door.
5. This bulletin board is _____ centimetres long.
6. My seat is _____ dm away from the teacher's desk.
7. The floor tile are _____ centimetres square.
8. This box of salt is _____ cm in diameter.
9. This cup is _____ cm in diameter.
10. From this spot, it is _____ dm to the nearest sink.
11. This counter is _____ m long.
12. This filing cabinet is _____ centimetres long.
13. The display case in the hall is _____ dm long.
14. This washing machine is _____ decimetres high.
15. This towel is _____ centimetres long.
16. This napkin is _____ cm wide.
17. This pencil is _____ centimetres long.
18. This pan has a diameter of _____ centimetres.
19. This cutting board is _____ centimetres long.
20. It is _____ dm from this spot to the folding door.

METRE POST TEST

DO NOT WRITE ON THIS SHEET. Write the letter indicating the correct answer for each statement on the response sheet.

1. The metre is a measure of
   a) weight [✓ b) length] c) volume d) time
2. A metre stick would be used to measure
   a) distance between cities b) width of a book
   [✓ c) length of a table] d) your waist
3. In place of inches, what metric unit will be used to measure the equivalent distances?
   [✓ a) centimetre] b) litre c) metre d) kilometre
4. A metre equals 100
   a) kl b) mm c) km [✓ d) cm]
5. The correct symbol for millimetre is
   a) M b) m [✓ c) mm] d) mm.
6. The prefix kilo means
   [✓ a) 1000] b) 100 c) 10 d) 1/100
7. The prefix milli means
   a) 1000 b) 100 c) 1/100 [✓ d) 1/1000]
8. The prefix centi means
   a) 1000 b) 100 [✓ c) 1/100] d) 1/1000
9. The length of a dining room wall might measure
   a) 40 cm b) 40 m [✓ c) 8 m] d) 80 mm
10. The length of a dress zipper might measure
    a) 35 mm [✓ b) 35 cm] c) 3.5 cm d) 3.5 m
11. The diameter of a nickel is approximately
    a) 2.1 m b) 2.1 mm [✓ c) 21 mm] d) 21 cm
12. Two cities are approximately 20 miles apart. The equivalent metric measurement is
    a) 8 km [✓ b) 35 km] c) 3500 m d) 80 dm
13. Which of the following lines appear to be 2 cm long?
    a) ____ [✓ b) ________] c) ____________ d) ________________
14. The diameter of the wire in a paper clip is approximately
    a) 1 cm b) 1 ml c) 1 m [✓ d) 1 mm]
15. A metre is
    a) slightly shorter than a yard b) the same length as a yard [✓ c) slightly longer than a yard] d) about twice the length of a yard.

Unit IV

CONCEPT: The LITRE as a measure of volume/capacity

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After participating in classroom activities the student will be able to:	The litre is the unit of volume or capacity in the metric system (derived unit).	Review and discuss pertinent transparencies.
	The litre is defined as a cubic decimetre (dm^3).	Display of volume measures.
recognize the name and symbol for the metric unit of volume	A litre is a little larger than a quart.	
	Symbol = ℓ(often mistaken for numeral 1, so it is best to write the name in full, or use the script (ℓ) form.	
	Use same prefixes as those used with the metre.	Name products which would be measured or purchased by litres.
list the prefixes commonly used with litre, write their symbols and values with 100% accuracy	The units most commonly used are: litre decilitre (dℓ) 0.1 millilitre (mℓ) 0.001 1 mℓ = 1 cubic centimetre (cm^3) cc is no longer correct 1 tsp. = 5 mℓ 1 tbsp. = 15 mℓ 1 cup = 250 mℓ 1 litre = 1.06 qts.	On enlarged drawing of a litre measure, identify the smaller units. Crossword puzzle. Play "Litre Maid (See Metre Maid in Appendix).

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
construct and label simple volume measures	A correctly constructed litre measure provides you with a useful tool for food preparation.	"Volume Measures". Using 9 oz. plastic cups, bottles, milk cartons and other containers, make own volume measures: litre, 250 mℓ cup, cubic decimetre, etc.
compare the relationship between linear and volume measure	Volume can be determined by measuring h x w x d (cm^3) 1 mℓ = 1 cm^3 1 ℓ = 1 dm^3	VOLUME transparency. Determine volume of refrigerator. Calculate the cm^3 of various boxes or containers.
recognize volumes that approximate 1 cm^3 and 1 litre	Estimating then measuring volume assists one in learning the metric system.	"Litre Practice Sheet". "Measuring With Litres".
follow directions in preparing a beverage using volume measures	Recipes written in metric measures are easy to follow. Use same principles as when measuring with customary units.	Prepare "Metric Mist-ery".

VOLUME MEASURES

Following pattern below, use light weight cardboard to make a cubic centimetre (cm^3). 1 cm^3 = 1 ml

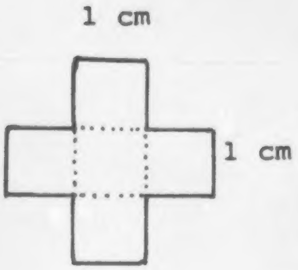
Fold on dotted line and tape edges as shown.

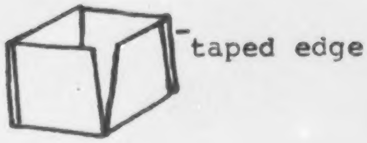
Using 10 cm (1 dm) sides, make a cubic decimetre (dm^3). 1 dm^3 = 1 litre.

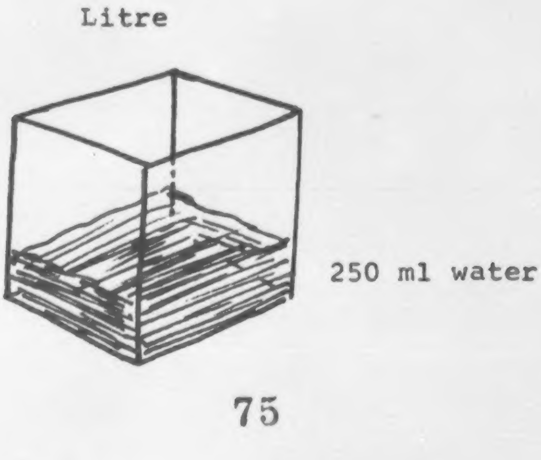
Compare the weight (mass) of a liquid to its volume:

a) How much water would you need to put into the litre to have 250 ml?

b) Using a balance or scales, weigh 250 grams of water.







Litre Practice Sheet

1. There are several containers at table No. 1. First write down how much water you think each will hold. Now, use the litre measure to fill them. What did you find out?

Container	My Guess	Actual Amount
A	____	____
B	____	____
C	____	____

2. On table No. 2 you will find a measure with exactly one litre of water. There is also a container marked "?" filled with a pre-measured amount of water. By looking at the full litre, estimate the amount of liquid in the container marked "?".

____ ℓ your estimate

____ ℓ actual measurement

3. On table No. 3 you will find typical servings of various beverages. Estimate, then measure, using the 500 ml measure:

Beverage	Estimate	Actual
Orange juice	____ ml	____ ml
Cup of tea	____ ml	____ ml
Glass of water	____ ml	____ ml

4. Determine the volume of the containers found on Table No. 4. You will need your metre ruler. Test your calculation by putting that amount of water in the container.

Container	Calculation	Amount
A		
B		
C		

WORKSHEET

MEASURING WITH LITRES

LAB # ________ SCORE________

DIRECTIONS: Using a customary liquid measuring cup and a millilitre measure, find the following millilitres of water. Estimate the amount in millilitres first and write your estimate in the block below. Finally, measure the millilitres accurately.

	Estimate	Actual
1. 1 cup = ...		
2. 3/4 cup =.		
3. 2/3 cup =.		
4. 1/2 cup =.		
5. 1/3 cup =.		
6. 1/4 cup =.		
7. 1 Tablespoon = ...		
8. 1 teaspoon = ...		

9. If 1 cubic decimetre equals 1 litre of water, how much water will be in 1 cubic metre? ________ (Do your math below).

10. If a recipe of salad dressing calls for a cup of oil, 1/4 cup vinegar, 2 T. water, and 1 tsp. spices, what will the total volume be in millilitres? ________ (Do your math below).

METRIC MIST - ery

Combine in a saucepan:

- 450 ml cranberry juice
- 800 ml water
- 1 stick cinnamon
- 4 whole cloves

Bring to a boil, then remove from heat.

Remove spices.

Add and mix well:

- 1 small can frozen lemonade
- 32 g sugar

Reheat and serve.

Unit V

CONCEPT: The GRAM as a measure of mass/weight

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After participating in classroom activities the student will be able to: distinguish between mass and weight	Mass is the amount of matter in an object. It refers to what we commonly refer to as weight. However, weight is the measurement of gravitational force on an object and varies with location. Mass remains the same everywhere.	Review and discuss pertinent transparencies.
list the units most commonly used, with their symbols and values	Since the gram is rather small for practical applications, the kilogram has been officially designated as the base unit of mass. The denominations in practical use are: milligram (mg) gram (g) kilogram (kg) One gram is about the weight of a paperclip. 200 nickels equal 1 kilogram. 1 kg = 2.2 lbs. The mass of a person is given in kilograms. 1000 mg = 1 g 1000 g = 1 kg 1000 kg = 1 tonne	To help develop a sense of mass, pass around objects of various weights. (Borrow mass pieces from science teacher). Use metric bathroom scales to determine body mass.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
identify in writing the relationship between mass, volume and length as they learn to compute metric mass from metric volume	In the metric system mass, volume and length are correlated: 1 ml water = 1 g = 1 cm^3 1 litre water = 1 kg = 1 dm^3 1 m^3 = 1 tonne	Compare the mass of a liquid to its volume. Demonstrate correlation using: 1 ml water 1 cm^3 1 paper clip, etc. Demonstration of the dm^3 as being equal to 1 kg and a litre. Analysis of equivalency charts.
develop skill in the use of scales and balances to correctly determine the mass of given items	Scales or balances are used to determine mass.	Demonstrate correct use of scales and balances.
develop skills in determining metric mass by estimating, weighing and recording the weights of designated objects	Size is not a reliable predictor of mass.	Complete worksheets: "Weighing By Grams". "Gram Practice". Discussion: Accuracy of measuring time involved quality of measuring or weighing devices.
exhibit skills in metric mass by converting a recipe to gram units	Writing recipes in metric form will require "rounding" up or down in amounts.	Convert a recipe to metric mass.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
accrue an awareness of the commercial use of metric units	Canned fruit and vegetable weights are indicated in both ounces and grams. Canned juice volume is indicated in ounces and litres. Nutrition information on food labels will be expressed metrically.	Display of boxes and cans of food with metric labels. Examine labels Students visit various stores in pairs. Shop only 15 minutes, recording information on "Metric Shopper". (or arrange classroom as a Metric Market, with areas for estimating, weighing, etc.)
solve mathematical problems using metric units	Shopping is easier with metrics due to the decimal system.	Unit pricing sheet "Metric Market" Discussion - ease or difficulty of computing unit price in grocery stores.

WORKSHEET

WEIGHING BY GRAMS

LAB # ________ Score

Names of Lab members present:

DIRECTIONS: Estimate each of these dry ingredients in grams. Record your estimate. Then, using gram scales, weigh and record the weight in grams. Use the correct abbreviations after the weight.

	Estimate	Actual Weight
1. 1/2 tsp. salt		
2. 1 tsp. baking soda.		
3. 1 tsp. baking powder.		
4. 1/2 c. sifted flour		
5. 1/4 c. rolled oats		

6. If 1 cubic decimetre = 1 litre of liquid, and 1 litre of water = 1 kilogram in weight, how much would 5 cubic decimetres of liquid (water) weigh?______

Do your math below:

7. If 1 kilogram = 2.2 pounds, how much would a 150-pound person weigh in kilograms? ________

Do your math below:

GRAM PRACTICE

1. There are 8 objects on table No. 1. Beside each object is a list of three figures representing possible weights. In the blank following the name of each object, write the figure you have chosen as the correct weight.

    1. box of thumbtacks ______
    2. 1 dollar bill ____
    3. 1 box powdered sugar ____
    4. 2 nickels ____
    5. 2 pounds cheese ____
    6. 25 pounds flour ____
    7. text book ____
    8. chalkboard eraser ____

2. At table No. 2 is a set of personal scales. Determine your weight in kilograms by using the scales.

    My weight is ____ kg.

    I weigh ____ lbs. (kg x 2.2)

3. Using the objects on table No. 3, estimate the weights in grams or kilograms, then weigh them to see how close you were.

Object	Estimate	Actual Mass
1 cup sugar	____	____
1 pound salt	____	____
textbook	____	____
pencil	____	____
chalk	____	____
ruler	____	____

METRIC SHOPPER

As you shop, locate items which are marked metrically.

List them here	Metric unit	Customary unit

Of those products you found, which are labeled only in metrics?

What items are most often dual labeled?

Why is metric labeling of value to us?

Why are the measurements expressed in different units?

METRIC MARKET

At the table are grocery items labeled A and B. A is marked in customary units. B is marked in metric units.

A Find the unit price :

Large package -

Small package -

Which is the better buy?

B Find the unit price :

Large package -

Small package -

Which is the better buy?

Which problem was easier to compute?

Which of these are you most likely to find as you shop? (Check only those which are expressed in the proper unit for the item).

___ 1. Four kilograms of potatoes.
___ 2. Ten kilometres of gasoline.
___ 3. One metre of ribbon.
___ 4. One kilogram of homogenized milk.
___ 5. One litre of macaroni.
___ 6. One hundred centimetres of lace.
___ 7. Fourteen grams of oregano seasoning.
___ 8. Ten grams of denim fabric.
___ 9. One litre of orange juice.
___ 10. A 255 gram box of crackers.

KEY to last item: Proper units are 1, 3, 6, 7, 9 and 10.

Unit VI

CONCEPT: The JOULE

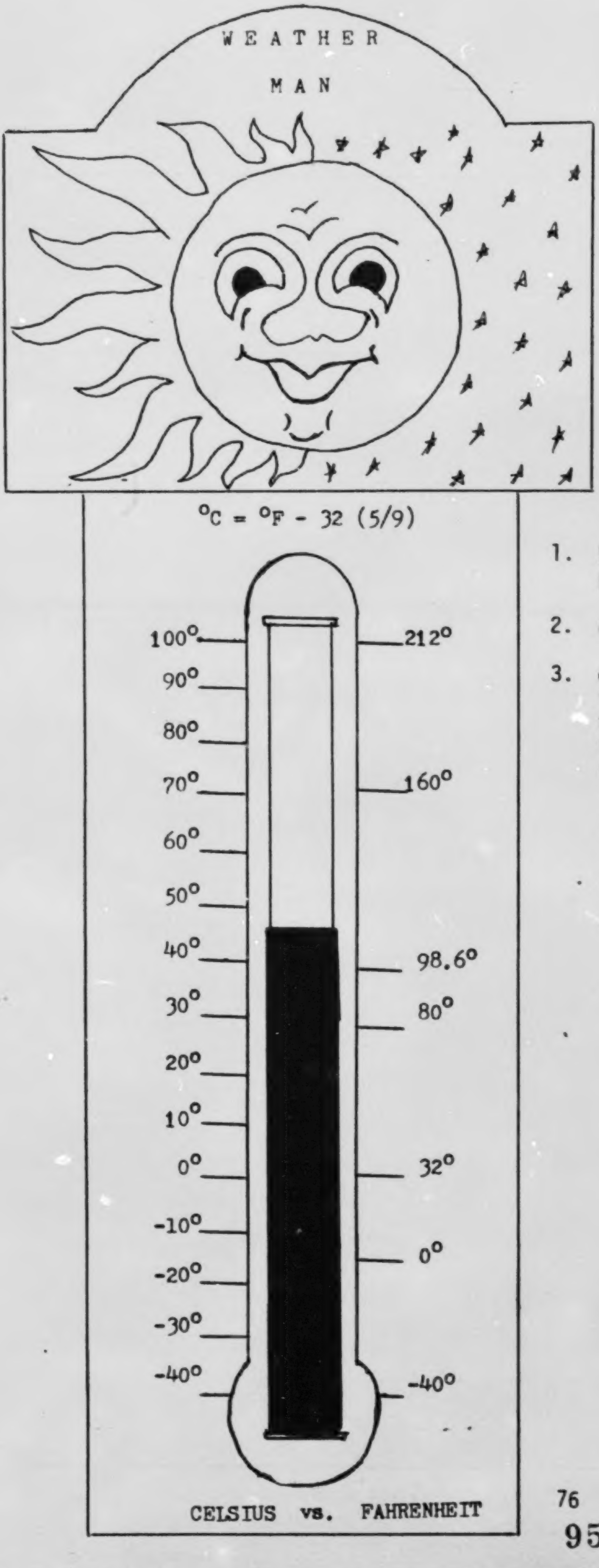
OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After participating in classroom activities, the student will be able to:	All forms of energy are expressed in joules (J). Pronounced jewels.	Review and discuss transparencies on JOULE.
differentiate between kilocalorie and kilojoule and correctly write the symbol for the metric unit	The nutrition calorie, which equals one kilocalorie, will be replaced by the kilojoule (kJ). 1 Calorie (kilocalorie)= 4.18 kJ	
calculate correctly the kilojoules in a day's diet	A 4 000 kilojoule diet is equal to a 1,000 calorie diet.	Keep record of day's meals, including snacks. Using the calorie chart from the Appendix of your text, calculate the total calories for food intake. Convert to kilojoules.

Unit VII

CONCEPT: Measuring temperature in degrees Celsius

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After participating in classroom activities, the student will be able to: write the name of the metric unit for temperature, as well as its respective symbol	Although kelvin is the base unit for (absolute) temperature, Celsius is the internationally preferred unit for practical use. Although we've used Centigrade, since 1948 Celsius is the only official term in most countries.	Display of Celsius thermometers commonly used in the home. Review and discuss the Celsius transparency.
identify common reference points on the Celsius scale	Common temperatures to remember: freezing 0°C room temperature 20°C warm day 25°C normal body temperature 37°C boiling 100°C	Bulletin board on Celsius. Visual "Weather Man".
exhibit skill in estimating, measuring and reading temperature metrically	Daily practice in reading degrees Celsius will more readily familiarize one with the Celsius scale.	Problem solving using everyday situations involving temperature. Worksheet "Bid Goodnight to Fahrenheit". Revise: oven dials and daily weather forecast.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
develop ability to adapt from the Fahrenheit to the Celsius scale	For most recipes the temperature can be changed to degrees Celsius by taking one-half the Fahrenheit value. 360°F = 180°C (exact) Temperature settings for baking should be rounded to the nearest 10 degrees Celsius.	See transparency: Fahrenheit - Celsius. "Weather - or Not".


WEATHER
MAN
°C = °F - 32 (5/9)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°
-20°
-30°
-40°
212°
160°
98.6°
80°
32°
0°
-40°
CELSIUS vs. FAHRENHEIT

DIRECTIONS:

1. 90 cm x 38 cm plywood
2. acrylic paint
3. elastic inserted for mercury through top and bottom slits in the board (magic marker may be used to color half the elastic red)

BID GOODNIGHT TO FAHRENHEIT

THINK CELSIUS

1. Read the temperature of these liquids:

    ice water ___°C

    cold tap water ___°C

    hot tap water ___°C

    full boiling water ___°C

2. Celsius thermometers have been placed in various locations. Record the temperatures of the following:

    room temperature ___°C

    outdoors - sun ___°C

    shade ___°C

    refrigerator ___°C

    oven at 350°F ___°C

3. Today's temperature is written on the chalkboard. Translate it into metric terms.

WEATHER - OR NOT

Circle the correct response to the left of each numbered statement.

Yes No 1.. It is 35°C outside. Would you go swimming?

Yes No 2. It is 20°C outside. Will you need your winter coat?

Yes No 3. It is 15°C outside. Will the outdoor pool be in use?

Yes No 4. The temperature is 27°C in the living room. Are you shivering?

Yes No 5. You have a 40°C body temperature. Are you sick?

Yes No 6. You have a 37°C body temperature. Do you have a fever?

Yes No 7. The water was 15°C in your bath. Was it chilly?

Yes No 8. The room thermostat was set at 20°C in March. Was it comfortable?

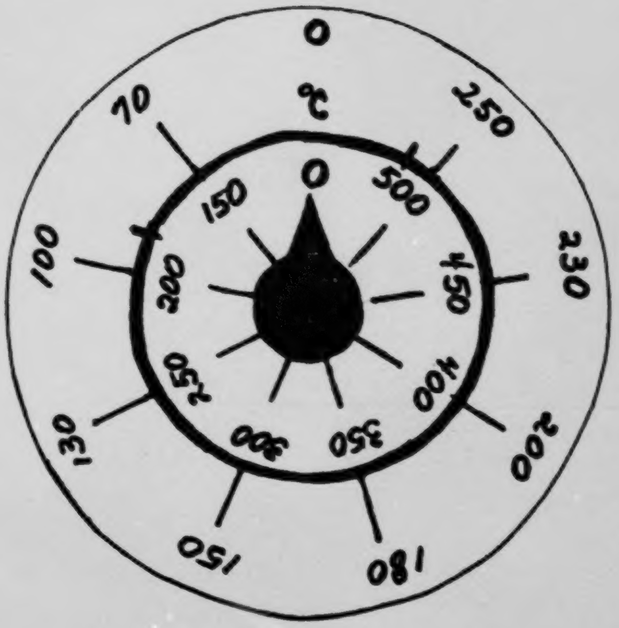
Yes No 9. Your 50°C cup of chocolate is delicious. Will it burn your tongue?

Yes No 10. In a 200°C oven you baked a cake. Did it burn?

KEY:
1. Yes
2. No
3. No
4. No
5. Yes
6. No
7. Yes
8. Yes
9. No
10. Yes

FAHRENHEIT - - CELSIUS

°F	°C	°C (Actual measurement)	
175	80	79.4	
200	90	93.3	
212	100	100	(Exact) Boiling temperature
225	110	107.2	
250	130	121.1	
275	140	135	
300	150	148.9	
320	160	160	(Exact)
350	180	176.7	
375	190	190.6	
400	200	204.4	
425	220	218.3	
450	230	232.2	
500	260	260	(Exact)


0
°C
250
230
200
180
150
130
100
70
0
500
450
400
350
300
250
200
150

Unit VIII

CONCEPT: Using Metric Measures in Foods Labs (Grades 9 - 12)

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
Following the basic introduction to SI metrics, the students will:	A knowledge of some basic measures, and application of these, assists in food preparation.	Review previous lessons as needed.
	As new utensils appear on the market, they will be metrically marked.	Examine metrically marked utensils.
apply metric principles to specific lab experiences	Weighing dry ingredients is faster, for there is no need to: sift flour pack brown sugar remove air spaces in shortening	Use metric kitchen scales and measuring tools to measure specific amounts of ingredients.
	Disadvantage - cost of accurate metric scales.	
	Liquids are measured by volume in both customary and metric systems.	

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
	Liquid measures:	
	The 250 mℓ measure (metric cup) is graduated in 25 mℓ divisions.	View transparency: "Metric cups and spoons".
	For larger amounts of liquid, there is a 500 mℓ and a 1 000 mℓ measure, graduated in 50 mℓ.	Examine displayed measures of all sizes.
	For household purposes, 1 litre of any liquid = 1 kilogram.	
	Additional measure sizes: *80 mℓ = 1/3 c *60 mℓ 1/4 c *30 mℓ 1/8 c	Label present customary equipment with metric equivalents.
	Small measures for liquid and dry: *0.6 mℓ = 1/8 tsp. 1 mℓ = 1/4 tsp. 2.5 mℓ = 1/2 tsp. 5 mℓ = 1 tsp. *7.5 mℓ = 1/2 tbsp. 15 mℓ = 1 tbsp. 25 mℓ = typical coffee measure *FOLEY includes these measures in their measuring sets.	
	The size of baking utensils is expressed in centimetres, with capacity expressed in litres.	Refer to "Common Utensils".

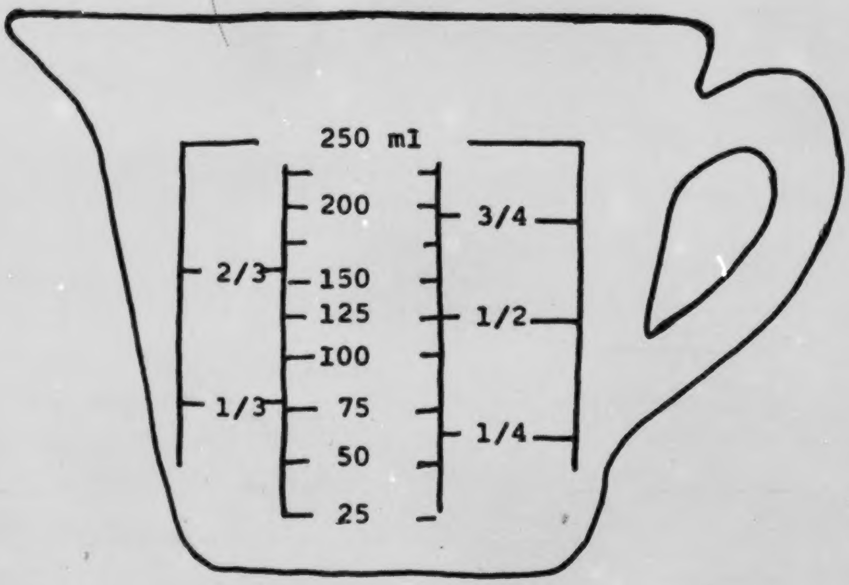
OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
increase skill in use of the Celsius scale	Thermometers aren't needed all the time. Terms tell us what to do without using a thermometer: simmer, boil, melt, lukewarm, chill, freeze. Until you become familiar with the Celsius scale, you may want to keep a chart handy. Most common oven temperatures:	Examine a "dual" oven dial. Review and discuss "Fahrenheit - Celsius" (See Unit VII)

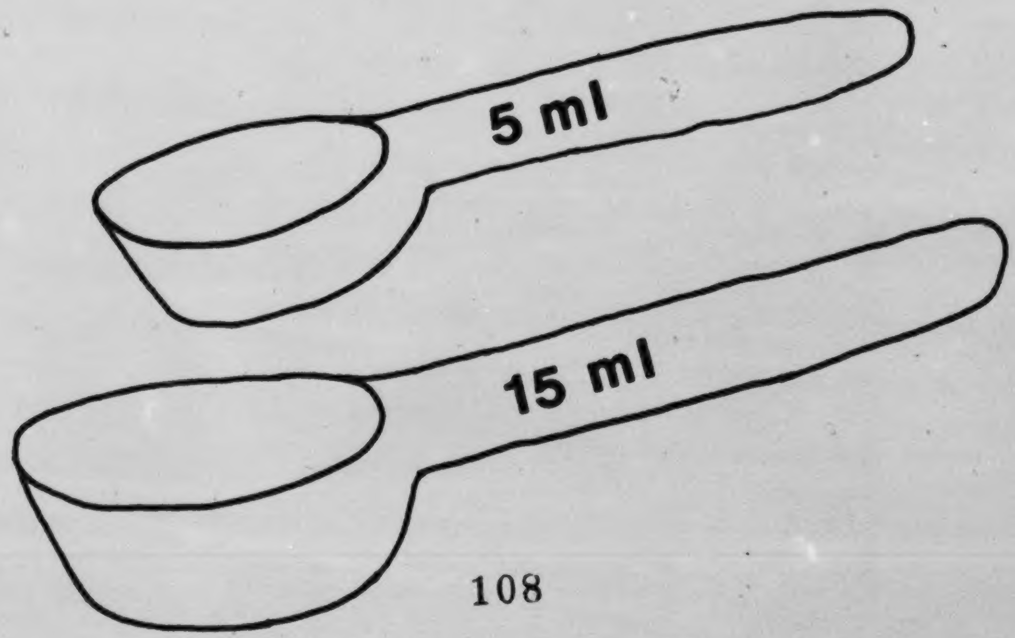
	°F	°C
very slow	250-275	120-135
slow	300-325	150-165
moderate	350-375	175-190
hot	400-425	200-220
very hot	450-475	230-245

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
exhibit skill in the use of metric units by converting a recipe into correct metric equivalents	Writing recipes in metric form will require "rounding" up or down in amounts. This requires testing metric recipes. Any increase in recipe volume will be within the tolerance of most pans. Because there is no simple relationship between SI and the customary system, exact conversion of amounts is not practical.	Investigate metric recipes and cookbooks. "Metricate" a recipe from customary measures. "The Metric Cook". "One cup of. . ." selected ingredients. "Measure With Me".

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
develop skills in use of metric volume and mass measuring tools in food preparation	Some people will still use the volume measure, although by weighing the ingredients recipe accuracy and improved products can be assured.	Demonstrate. Half the class follow customary procedures, half measure metrically to prepare a recipe. Evaluate: time spent in preparation no. of utensils used product results

METRIC CUP AND SPOONS


250 ml
200
150
125
100
75
50
25
2/3
1/3
3/4
1/2
1/4



COMMON UTENSILS

UTENSIL	Common Sizes	Rounded Metric Units
Cake pan:		
Round	8 X 1½	20 X 4
	9 X 1½	23 X 4
Rectangle	13 X 9 X 2	33 X 23 X 5
	10 X 6 X 1½	25 X 15 X 4
Square	8 X 8 X 2	21 X 21 X 5
	9 X 9 X 2	23 X 23 X 5
Tube	10 X 4	25 X 10
Jelly Roll	15½ X 10½ X 1	40 X 25 X 3
Cookie Sheet	16 X 11	41 X 28
	14 X 10	36 X 25
	10 X 8	25 X 21
Loaf Pan	9½ X 5 X 3	24 X 13 X 8
	7½ X 3¾ X 2¼	19 X 10 X 6
Pie Pan	9	23
	8	21

MEASURING UTENSILS

1 qt.	1 000 ml
1 pt.	500 ml
1 c.	250 ml
1/2 c.	125 ml
1/3 c.	80 ml
1/4 c.	60 ml
1 T.	15 ml
1 t.	5 ml
1/2 t.	1 ml

THE METRIC COOK

1. Measure 1 cup of flour:

Sift flour onto waxed paper, spoon lightly into the measure, level it off, then measure its mass.

1 cup of flour has a mass of _____ g

Compare results with your partner: _____ g

Difference _____ g

Conclusion:

2. Determine the metric sizes of the baking utensils on the worktable.

UTENSIL	CUSTOMARY	METRIC
cakepan	___________	___________
pie pan	___________	___________
cookie sheet	___________	___________
bread pan	___________	___________
pizza pan	___________	___________
casserole	___________	___________

3. Convert this lemonade recipe into metric terms:

Customary	Metric
1 c. lemon juice	___________
7 c. water	___________
3/4 to 1 c. sugar	___________

Combine ingredients. Pour over ice in tall glasses. Garnish with fresh mint.

ONE CUP OF . . .

selected ingredients

	grams
flour (sifted)	115
granulated sugar	200
brown sugar	165
butter or margarine	224
hydrogenated shortening	188
milk (liquid)	250
nuts (chopped)	124
peanut butter	227
confectioners sugar	115
molasses	250

7

SOME EQUIVALENT WEIGHTS AND MEASURES

1 oz. = 30 g = 30 ml = 0.03 ℓ

1 lb. = 500 g = 0.5 kg

1 g = 0.035 oz.

1 kg = 32 oz. = 2.2 lb.

1 pt. = 0.5 ℓ

1 qt. = 0.946 ℓ

1 ℓ = 33.8 fluid ounces = 2.1 pt. = 1.05 qt.

MEASURE WITH ME

1. One teaspoon = _____ ml

2. An 8 inch pie pan measures _____ cm Now, in the puzzle below, locate your answer to question #1. Draw a line from answer #1 to answer #2.

3. A 350°Fahrenheit oven is _____°C Draw a line to the answer for this question. Understand how it works now? Continue and solve the puzzle.

4. The standard metric measuring utensil has a capacity of _____ ml

5. Water boils at _____°C

6. One tablespoon is equal to _____ ml

7. A 14 inch cookie sheet is _____ cm long.

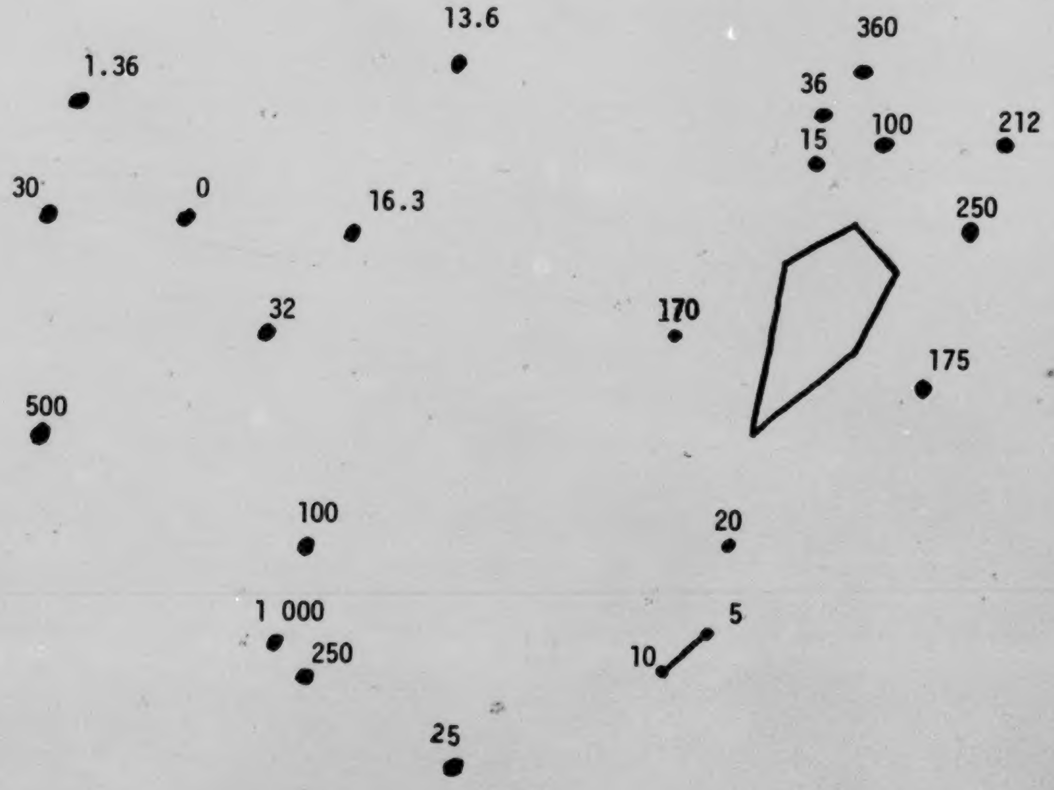
8. A 46 oz. can of fruit punch contains _____ l

9. Water freezes at _____°C

10. One litre is the same as _____ ml

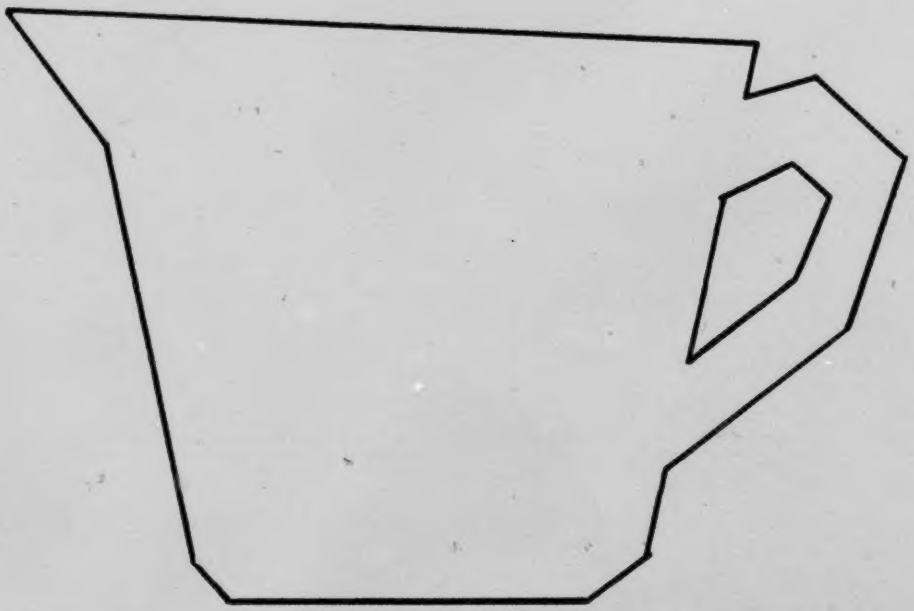
11. One cup of peanut butter weighs approximately _____ g

12. If one kg of potatoes costs 20¢, how much would you pay for 500 g of potatoes? _____¢



KEY: MEASURE WITH ME

1. .5
2. 20
3. 175
4. 250
5. 100
6. 15
7. 36
8. 1.36
9. 0
10. 1000
11. 250
12. 10



Unit IX

CONCEPT: Using Metrics in Clothing Labs

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
By completing the selected activities, students will:	Metric sizes are quite different from customary measurements numerically.	Use fashion catalogs to study pattern sizing.
discover the relationship of the metric system to clothing	Use centimetres for body measurements. (Review previous lessons as needed). Pattern companies are already using metric terminology.	Take body measurements. Determine own clothing size. "Metric Me". "Metrics in Patterns". Check for accuracy.
apply previous learnings to determine own size in metric measure		
interpret meanings of numerals and symbols related to pattern usage in metrics	Fabric is measured in metres. Zippers, trims and elastic are measured in centimetres. (Learnings dealing with metrics related to patterns are listed in question form on attached worksheets).	Study commercial patterns. Using an enlarged pattern envelope determine: fabric needed thread zipper length "Clothing Activity Sheet".
apply learnings to construction of a garment or other project	(Use customary learnings - converted to metric language) As you develop sewing construction skills, you are also developing metric usage skills.	Re-label seam guides with 1.5 cm Construct garment. Evaluate garment.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
		Project sheets: Duffel Bag P J Metribag Bean Bag Apron and Head Band Blue Metric Jeans Totable

METRIC ME - PERSONAL MEASUREMENT SHEET

SUPPLIES:
- Personal Measurement Sheets
- Tape measures
- Height chart (on wall)
- Bathroom scale

PROCEDURE:

Using the personal measurement chart below, fill in the blanks for your height, weight (mass), and body dimensions.

My weight or mass is ____ kg   My height is ______ cm

MISSES PATTERN SIZES•		8	10	12	14	16	18		ME	
STANDARD BODY MEASUREMENTS	Bust	80	83	87	92	97	102	cm	___	cm
	Waist	61	64	67	71	76	81	cm	___	cm
	Hip - 23 cm below waist	85	88	92	97	102	107	cm	___	cm
	Back waist length	40	40.5	41.5	42	42.5	43	cm	___	cm

•Metric measurements are based on the Standardized Pattern Measurements approved by the MEASUREMENT STANDARD COMMITTEE of the Pattern Industry.

Compare your metric measurements with the chart above, then determine what your metric pattern size would be.

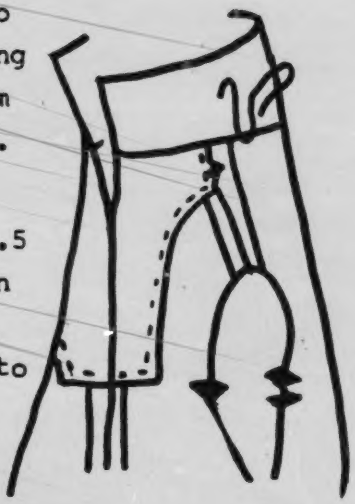
Size ______

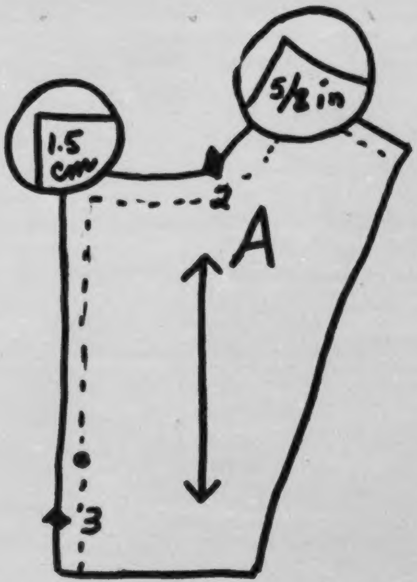
Name ______________

METRICS IN PATTERNS

Turn facing to INSIDE, turning back neck seam toward collar. Press.

Press under 1.5 centimetres on raw edge of collar; trim to 6 mm (1/4"). Slip-stitch pressed edge of collar over neck seam, matching centers back. Tack facing to seams.





Be aware of metric measurements when you sew.

Answer the following questions by looking at the above illustrations and the attached METRIC ME - PERSONAL MEASUREMENT CHART.

1. The standard seam allowance used in sewing is ______ cm
2. The three most common linear units used when sewing are the ____________, the ______________, and the ___________.
3. The symbols for the above are _____, _____, and _____ .
4. The body measurements for a size 12 pattern are:

   bust ___________

   waist ___________

   hips ___________

   back neck to waist ___________

CLOTHING ACTIVITY SHEET

At the table you will find a pattern envelope and several pattern pieces. Using these materials, determine the following:

1. What is the metric seam allowance?
2. What other metric measurements do you find on the pattern pieces?
3. If you have these measurements 84 - 63 - 88, what size pattern would you select?
4. What are the standard widths of fabrics in metrics?
5. For the size determined in #3, list all items you would need to purchase, and the amounts needed for each. The fabric you want to purchase is 115 cm wide.
6. When you go shopping to purchase your pattern and fabric, find out if the fabric department is planning to change to metric measures, or whether it is already changed. What is the attitude of the clerks toward this change?

SEWING WITH METRICS

Supplies needed for DUFFEL BAG:

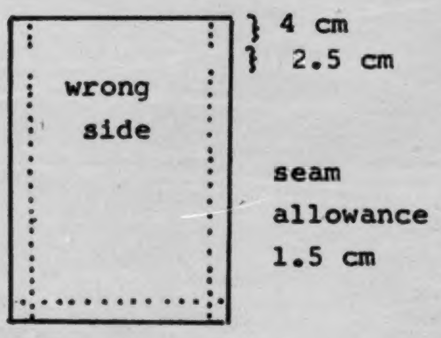
Heavy cotton fabric 80 cm by 92 cm
Matching thread
Rope, heavy cord or heavy shoestring 2 metres

Preparing the fabric:

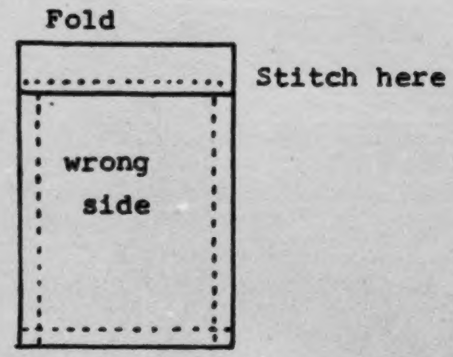
1. Preshrink the fabric.
2. Straighten the ends.
3. Tear fabric into two pieces, each measuring 40 cm by 92 cm

Ready to sew:

1. Pin right sides together.
2. Sew around 3 sides twice using a number 12 stitch and leaving openings for cord (see illustration).
3. Secure threads at cord openings and at end of seams.
4. Press seams open.



5. Turn top under 1 cm and press.
6. Pin top down 3 cm to form rope casing. (See illustration). Press.
7. Sew close to bottom of hem, using number 12 stitch.
8. Cut cord into two equal lengths.
9. Using a safety pin as a guide, insert cord through holes and tie the two ends together in a secure knot.



A PJ METRI*BAG

A PJ Metri*Bag that doubles as an attractive pillow for bed or window seat.

Materials Needed:

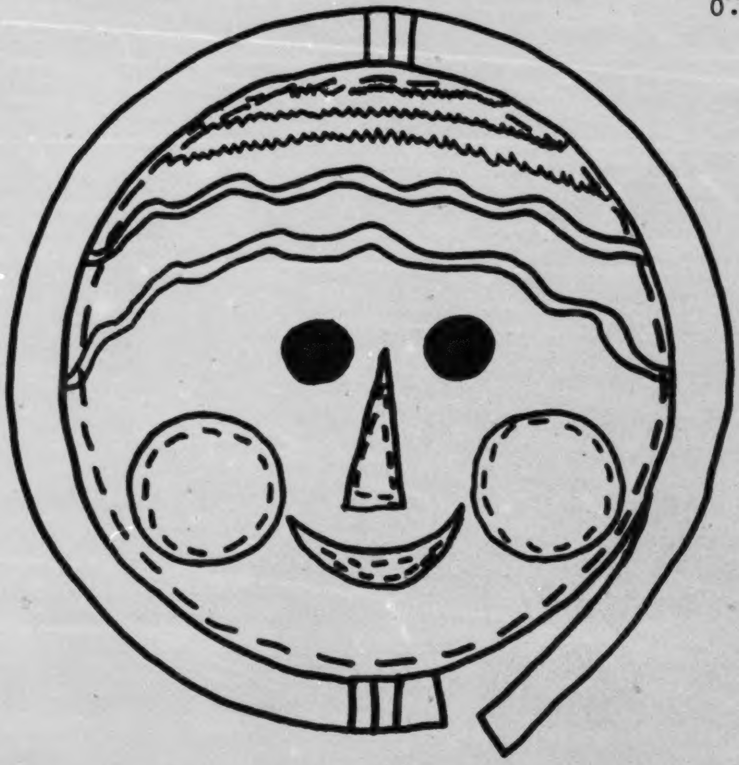
Felt in the following sizes:

- 50 cm yellow circle (face tront)
- 55 cm orange circle (face back) plus felt for nose and mouth
- Two half-dollar size (3 cm) circles (eyes)
- Two 10 cm magenta circles
- Spool of Talon Polyplus Thread
- 40 cm Talon Invisible Zipper
- Pkg. Talon Orange Jumbo rick rack
- Pkg. Talon Orange baby rick rack
- Fabric glue

To Make:

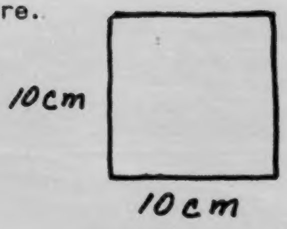
1. Cut 55 cm circle in half and apply zipper according to pkg. directions.
2. Topstitch cheeks, nose and mouth in place on yellow circle; then glue eyes in place. Also, stitch rick rack as shown above.
3. With wrong sides of yellow and orange circles together, topstitch 5 mm from edges of yellow circle. Trim orange circle even with yellow circle.

*Equivalents are only approximate. REMEMBER: 0.10 m = 10 cm
0.20 m = 20 cm, etc.

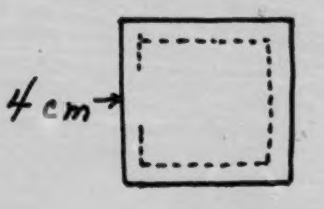


What's Your Bag?

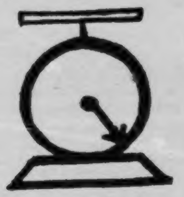
1. Measure 2 squares of fabric 10 cm square.



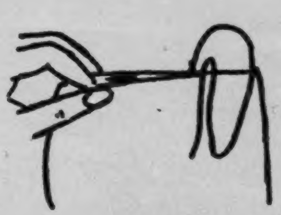
2. With wrong sides together, stitch as indicated using a 1.5 centimetre seam. Opening is 4 cm.



3. Weigh 240 grams of dry beans. Fill your bag with these beans.



4. Turn raw edges to the inside and stitch the top closed by hand.



APRON and HEADBAND

Using a metre stick, measure your fabric in centimetres.

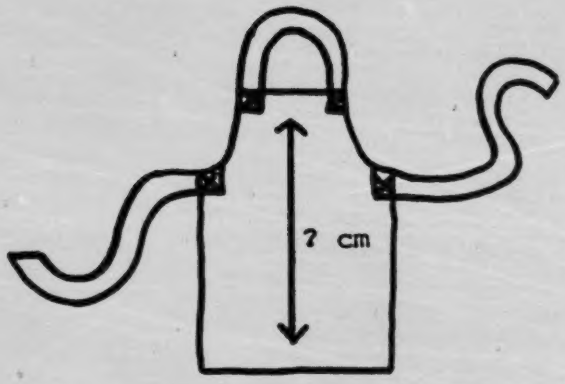
Width of my fabric = ______ cm

Length of my fabric = _____ cm

Fitting your pattern:

APRON

Measure from the top to the bottom as illustrated:



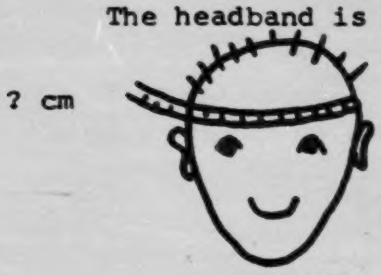
_____ cm

add for hems : + 6 cm

TOTAL LENGTH _____ cm

HEADBAND

The headband is 18 cm wide. For length, measure the circumference of your head:



_____ cm

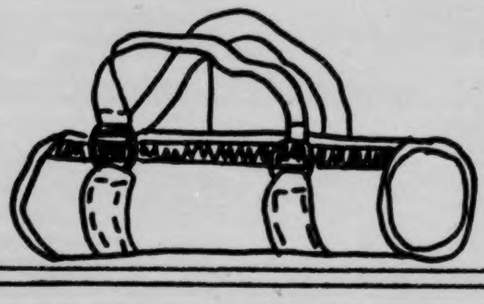
add for seams : + 3 cm

TOTAL LENGTH _____ cm

Constructing the pattern:

APRON: Add or subtract needed centimetres at the bottom of the apron pattern to fit your length.

HEADBAND: Using a metre stick and your measurements, construct your headband pattern from newspaper.



"BLUE METRIC" Jeans Totable

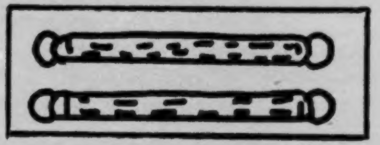
Materials Needed:

Pair of old jeans
Four large rings (Cafe curtain rings)
0.90 m iron-on interfacing
Spool of Talon thread
35 cm Talon Big Zipper
3.4 m of Talon trim (5-8 cm wide)
Pkg. of Talon piping

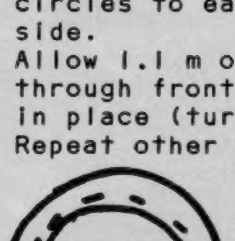
To Make:

Use 1.5 cm seams throughout.

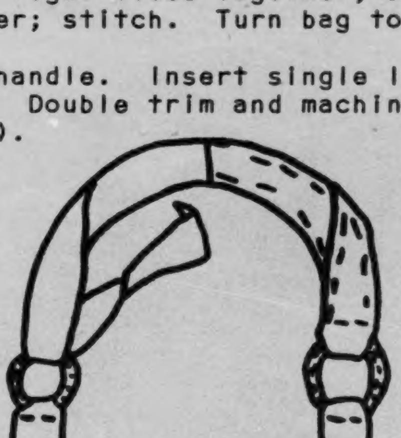
1. Cut off jean's legs and open one seam on each leg. Make a rectangle 41 x 59 cm, combining 41 cm long pieces from legs. With remaining fabric, cut 2 circles 20.5 cm in diameter. Back all pieces with iron-on interfacing.
2. Position 64 cm lengths of trim as shown. Fold each end under 8 cm, insert ring, and machine stitch in place.



3. Turn seam allowances of short rectangle edges under 1.5 cm and press. Position folded edges close to zipper teeth and stitch (bag becomes a cylinder). Partially open zipper.
4. On the right side of circles, position seamline of cording 1.5 cm from out edges of circles, overlapping ends as shown (remove piping filler for 1.5 cm). Machine baste (A).
5. Turn bag to wrong side. With right sides together, baste circles to each end of cylinder; stitch. Turn bag to right side.
6. Allow 1.1 m of trim for each handle. Insert single length through front and back rings. Double trim and machine stitch in place (turn raw ends under).
Repeat other handle (B).



A



B

CONCEPT: Metric Chef's Hat

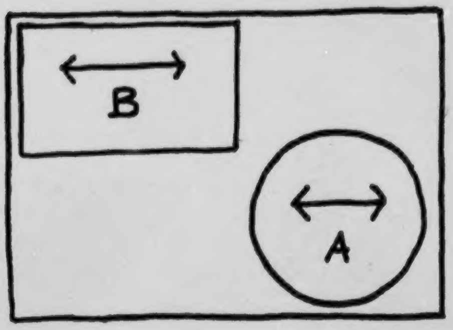
OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
Students will apply learnings from prior study of METRE to determine body size in metric measure	Commercial patterns have metric measures. Making accurate record of body measurements, aids in purchase of patterns and clothing. Metric sizes are much different from customary sizes numerically.	Use of transparency (Pink Panther) to show body measurements to be taken. Students record own measurements on individual sheets (same as transparency. Pink Panther - 1 metre tall for bulletin board.
Using a self made metric measure, each student will make own pattern pieces for a chef's hat	Making and using metric tools helps develop skills in THINKING METRIC Making an accurate pattern reduces the chance for sizing error in the completed project.	Discuss pattern sizes. Cut out and mark paper pattern, following directions. Check and alter as needed. Try on a "sample" hat.
After observing a demonstration of the layout and cutting procedures, students will duplicate the steps	Using learned metric skills and self made metric tools, reinforce the concept of metrics.	Layout. Instructor check. Cut out.
Following printed directions, students will construct a chef's hat to be judged on pre-determined criteria	(See attached layout and direction sheets).	Construct hat following printed directions. Evaluate: Ability to follow directions Construction Accurate fit

METRIC CHEF'S HAT
FABRIC LAYOUT

(Requires 1 metre of woven fabric)

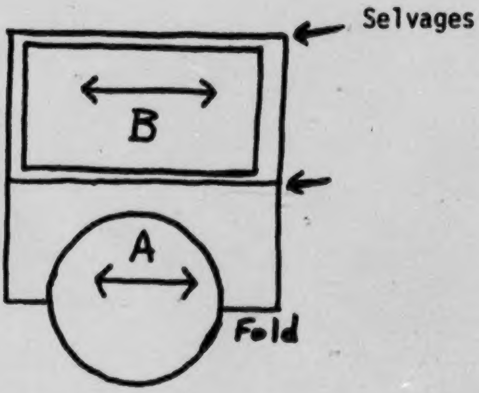
FABRIC WIDTH

90 cm
(36")



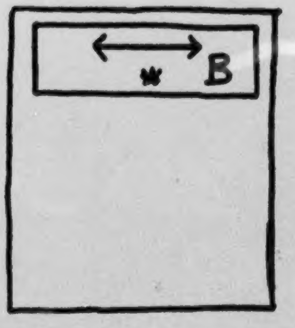
SINGLE
THICKNESS

115 cm
(45")



INTERFACING

90 cm, 115 cm
(36", 45")



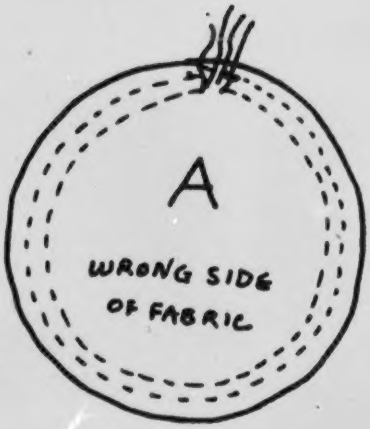
SINGLE
THICKNESS

*B folded in half
lengthwise

Note: Crown (A) is one piece - a 50 cm circle.
Band (B) is one piece - 40 cm wide.
For band length, measure around head, add 3 cm.

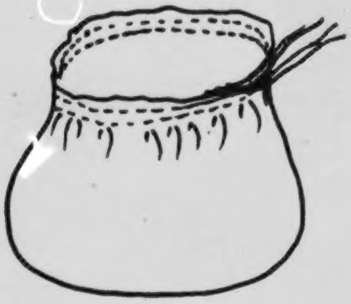
METRIC CHEF'S HAT

Interfacing

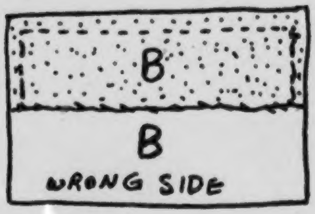


STEP

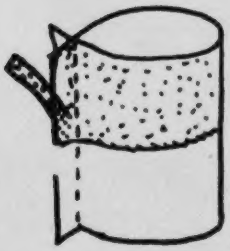
1. Using a basting stitch on the sewing machine, stitch along lines as shown (1.5 cm and 1 cm from edge).



2. Pull ends of bottom threads gently to gather.



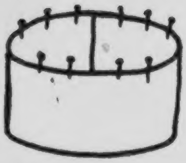
3. Baste interfacing B to wrong side of band B. Tack invisibly along foldline.



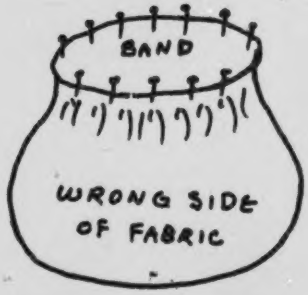
4. Fold ends of B together, right sides together and stitch ends using a 1.5 cm seam.

   Trim interfacing close to stitching.

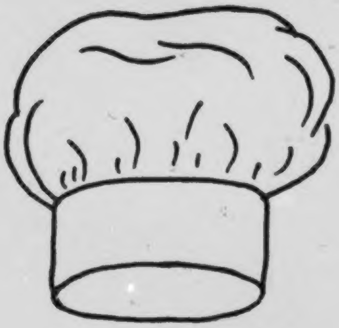
   Press seam open.



5. Fold band in half, wrong sides together. Baste raw edges together (may be pin basted).


BAND
WRONG SIDE OF FABRIC

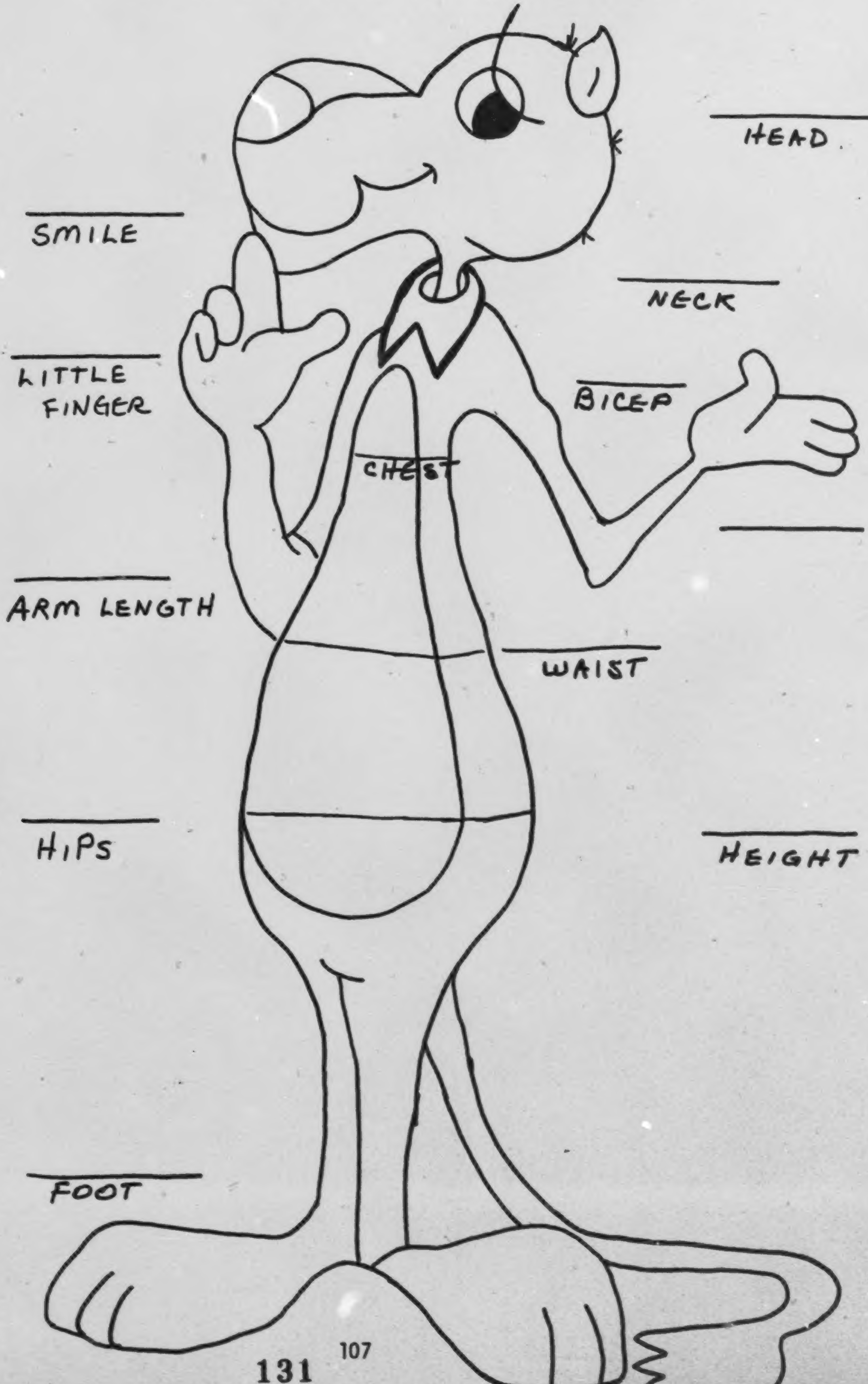
6. Pin band to crown, right sides together, adjusting gathers evenly. Stitch 1.5 cm seam.



7. Zigzag stitch the unfinished edge.

Press.

HOW DO YOU MEASURE UP?


HEAD
SMILE
NECK
LITTLE FINGER
BICEP
CHEST
ARM LENGTH
WAIST
HIPS
HEIGHT
FOOT

Unit X

COURSE TITLE: Interior Decoration TIME: 2 - 3 weeks

UNIT TITLE: Windows and Window Treatment LEVEL: Secondary - Grades 11 and 12

CONCEPT: Awareness of the SI Metric System, with emphasis on METRES and the proper use of terms, prefixes and symbols.

GENERALIZATIONS: Introduction of METRICS on a small scale can secure the foundation when final changeover is made.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
The student will exhibit knowledge of the progress made in metric acceptance and use by the presentation of a short history of chronologically important dates and happenings, listing at least six important dates.	The metric system would increase world trade for the United States. Progress has been made in the increased acceptance of METRICS as indicated by the following important dates and happenings: 1790 - Jefferson presented a plan. 1795 - French - metric system. 1866 - Metric system was made legal in the United States. 1875 - Treaty of the Metre. 1960 - Modernized International System of Units (SI) adopted. 1965 - England started conversion; to be completed in 1975. 1968 - U.S. Congress passed Metric Study Act. 1971 - Report of U.S. Study given to Congress. 1975 - England completes conversion. 1975 - President Ford signed Metric Conversion Act.	View the transparency map with discussion on metric and nonmetric countries. (Map in Unit I). Students place dates and events in their notebooks for future reference.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
The student will develop fluency with metric vocabulary, with emphasis on the METRE, and shall become knowledgeable in the use and understanding of the metre prefixes and symbols.	LENGTH in SI Metric is expressed in METRES, with the following prefixes and symbols being of importance: 1 kilometre (km) = 1000 metres 1 hectometre (hm) = 100 metres 1 dekametre (dam) = 10 metres 1 metre (m) = 1 metre 1 decimetre (dm) = 0.1 metre 1 centimetre (cm) = 0.01 metre 1 millimetre (mm) = 0.001 metre	Students add basic metric terms, prefixes, symbols, and equivalents in their notebooks for permanent reference.
The student will identify, orally or in writing, all prefixes and symbols.		Use "Prefixes and Symbols" (In Unit II).
Given the necessary supplies and directions, the student will construct a collapsible "metre stick", using five sections of 20 cm each.	The collapsible metre stick will be used to do all measurements in the unit and no reference will be made to the CUSTOMARY system. (Directions in Unit III).	Construction of metre stick. The student will choose three areas in the classroom to measure; ie., the top of the student desk, the doorway into the classroom, and the top of the teacher's desk.

CONCEPT: METRIC usage in choosing window types and window treatments.

GENERALIZATIONS: The proper treatment of the windows in a home is an essential part of Interior Decoration.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
The student will identify the 18 basic types of windows.	Windows are divided into 18 basic types: 1. Double-hung 2. In-swinging Casement 3. Out-swinging Casement 4. Ranch or Strip 5. Awning 6. Jalousie 7. Picture 8. Dormer 9. Bay 10. Bow 11. Slanting 12. Double 13. Corner 14. French Doors 15. Sliding Glass Doors 16. Clerestory 17. Arched 18. Glass Wall	Students view 18 transparencies of window types, then list outstanding features of each. Students will transfer information to study guides (duplicate pictures with blank areas for placement of a caption above the picture and a listing of the outstanding features beneath the picture). Discuss pros and cons of each window type. Use "Guide to Window Beauty", Kirsch Co., for drawings of windows and window treatments. Also "The how-to of well dressed windows" by Kirsch.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
The student will identify in writing the basic parts of all windows.	Windows have 7 basic parts: 1. Casing - fixed part of window 2. Frame - sash 3. Pane - the glass 4. Muntins - narrow horizontal strips separating small glass panes. 5. Mullions - narrow vertical strips separating small glass panes. 6. Sill - narrow edge at bottom of window. 7. Apron - part of casing below the window sill.	After viewing a transparency of the 7 basic parts of a window, students will label a duplicate picture of a window. The picture will be drawn to metric scale. Students will place the designated measurements on the drawing.
The student will identify the 15 basic window treatments.	Window treatments are divided into 15 basic treatments. 1. Shirred Glass Curtains 2. Traverse Curtains 3. Shirred Draperies 4. Traverse Draperies (two-way draw) 5. Traverse Draperies (one-way draw) 6. Cafe-type Draw Draperies 7. Cafe Curtains 8. Sash Curtains 9. Criss-cross Curtains 10. Ruffled Tie-back Curtains 11. Swinging Rod Treatment 12. Dimensional Curved Treatment 13. Arched Treatment 14. Slanting Traverse Draperies 15. Swinging Door Draw Draperies	View 15 transparencies of window treatments. Students transfer this information to study guides (duplicate pictures with blank areas for placement of a caption above the picture and a listing of the outstanding features beneath the picture). Discuss pros and cons of each window treatment. Students choose a minimum of 10 pictures of different window treatments which will become a part of their notebook for future reference.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After a step by step procedure for proper measuring is presented and understood, each student will properly measure a chosen window in their home and compute the square metres of cloth needed to construct one pair of unlined draw draperies.	Draperies constructed at home, after knowledge of proper measuring and construction is gained, will result in a monetary saving and a satisfaction gained from having completed something that adds beauty to the home for a fraction of what it would cost for "ready-made" or "custom-made" draw draperies.	Students submit a scaled drawing of the window chosen in their home for draping, with the proper computation of the square metres of material needed for one pair of unlined draw draperies. The student will submit a "word-search" puzzle, using a minimum of fifteen terms, either metric or other terms used in conjunction with window types and window treatments. Use the transparencies on window type and window treatment to test the students. (Blocking out the captions and other information). Provide students with response sheets. Include opportunity to use metre stick.

APPENDIX

METRIC TEST

NAME . . . . PERIOD . . . . . SCORE . .

I. PREFIXES and SYMBOLS. Complete the chart below by giving the correct metric prefix, numerical value and symbol. (18 pts.)

UNIT	PREFIX	VALUE	SYMBOL
1000 X			
100 X			
10 X			
1/10 of			
1/100 of			
1/1000 of			

II. MULTIPLE CHOICE: Select the BEST answer and place the letter in the space provided. (10 points).

___ 1. Which of the following is not a method of measuring?
a) Customary b) American c) Metric d) Imperial

___ 2. To measure the length of a pencil in metrics, we need a
a) metre stick b) centimetre ruler c) millimetre measure d) cubic decilitre.

___ 3. A 350° F oven would be ___ in degrees Celsius.
a) 100 b) 150 c) 177 d) 200

___ 4. The diameter of an average dinner plate is
a) 15 cm b) 10 cm c) 3 m d) 25 cm.

___ 5. The length of a car is approximately
a) 1 m b) 6 m c) 3 m d) 5 m.

___ 6. To measure volume, we use
a) ml b) mm c) °C d) mg.

___ 7. Which container would best hold a decilitre of water?
a) bathtub b) swimming pool c) pill box d) small pitcher.

___ 8. In the Metric System, °C means degrees
a) Centigrade b) Kelvin c) Celsius d) Fahrenheit.

___ 9. Prefixes in the metric system refer to terms like
a) millimole and kilomole b) millimetre and kilometre
c) milliampere and kiloampere d) millicelsius and kilokelvin.

METRIC TEST (continued)

_____ 10. Which phrase makes the most sense?
a) 5 grams of water b) 5 metres of water c) 5 kilometres of water
d) 5 litres of water

III. TRUE or FALSE - Circle the best answer. (8 points)

T F 1. The height of an average man is 3 metres.

T F 2. Your shoe is about 8 centimetres long.

T F 3. A baseball player with a good arm could throw a ball 300 metres.

T F 4. A man can lift something that weighs 25 kilograms.

T F 5. On an interstate highway, 90 kilometres per hour would be a safe speed.

T F 6. The maximum depth of a public swimming pool would be 25 centimetres.

T F 7. A coffee cup would hold about 1/4 litre of coffee.

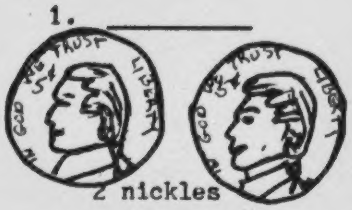
T F 8. An automobile gas tank would hold about a hectolitre of gasoline.

IV. Choose the most nearly correct weight and place the letter of that choice in the blank beside the picture.

WEIGHTS

A. 3 kilograms
B. 1 gram
C. 10 grams
D. 100 kilograms
E. 100 milligrams
F. 70 grams
G. 200 grams

1. _______



2 nickles

2. _______

Mouse

3. _______

Newborn Baby 6½-8 lbs.

4. _______

Pro football Player

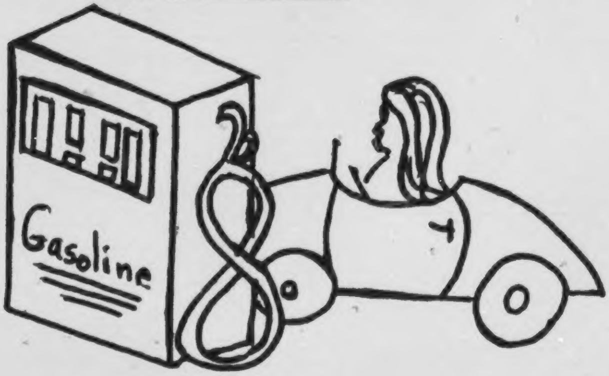
5. _______

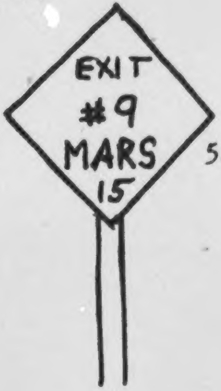
4 straight pins

METRIC TEST (continued)

V. IDENTIFY THE METRIC UNIT: Write in the blank the metric unit best suited to measure each item.

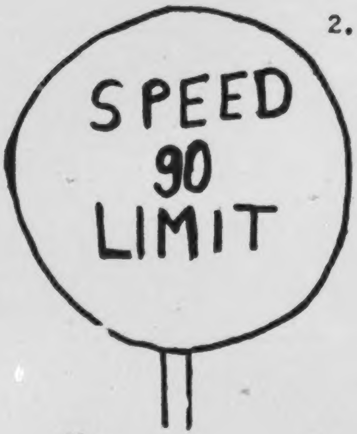
1. ______________

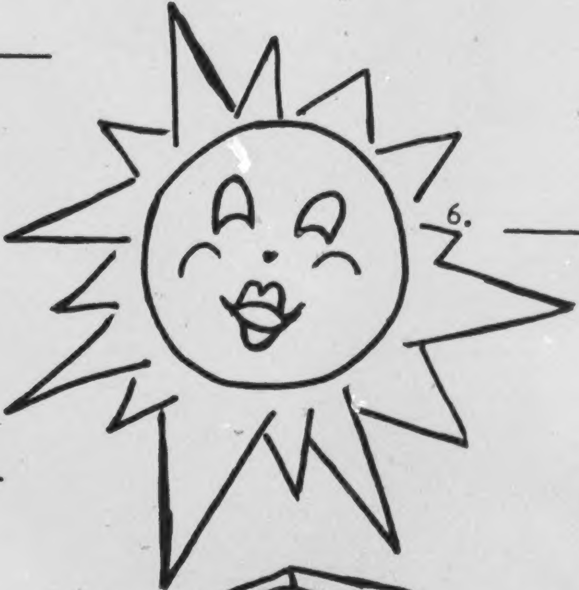



EXIT
#9
MARS
15

5. ______________

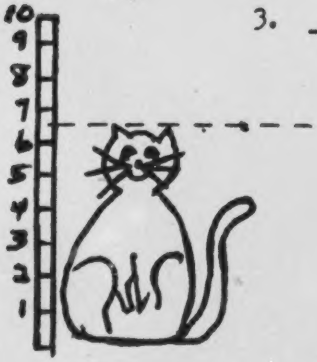
2. ______________

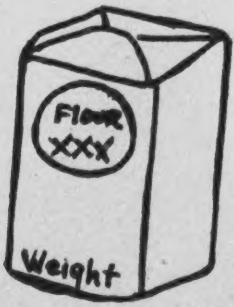

SPEED
90
LIMIT



6. ______________

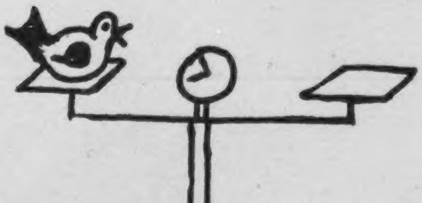
3. ______________

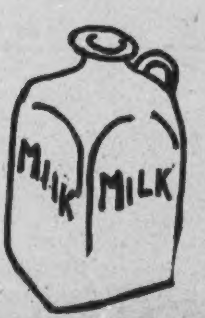

10
9
8
7
6
5
4
3
2
1


FLOUR
XXX
Weight

7. ______________

4. ______________



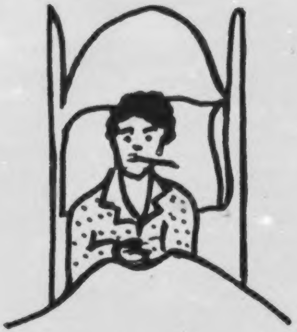


8. ______________

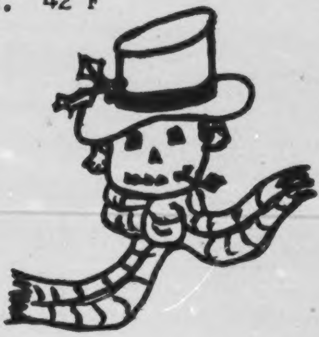
METRIC TEST (continued)

VI. Use the formula $^{\circ}F - 32 \times 5/9 = {}^{\circ}C$ to compute the following temperatures. Round off your answers to the next highest degree. SHOW YOUR MATH WORK IN ORDER TO GET CREDIT.

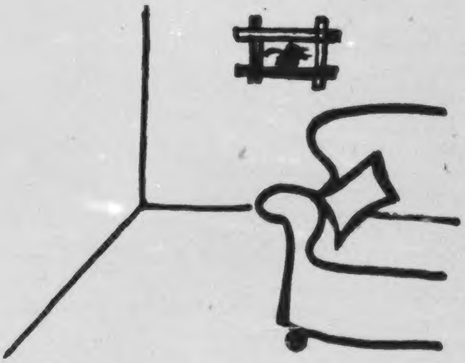
__________ 1. 98.6°F



__________ 2. 42°F



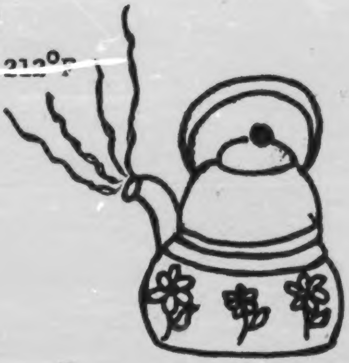
__________ 3. 72°F



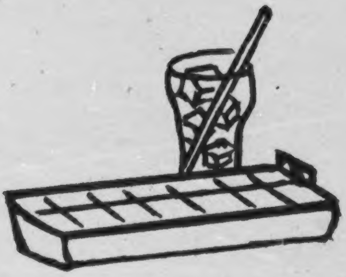
A. 100°C
B. 10°C
C. 30°C
D. 6°C
E. 37°C
F. 15°C
G. 0°C
H. 22°C
I. 40°C

METRIC TEST (continued)

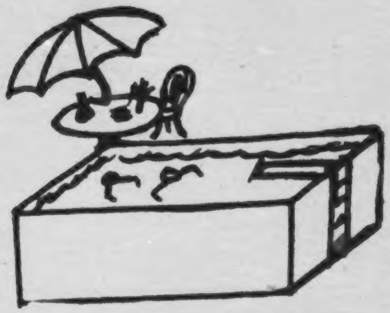
__________ 4. 212°F



__________ 5. 32°F



__________ 6. 86°F



METRIC TEST ANSWER SHEET

I.

kilo	1000	k
hecto	100	h
deka	10	da
deci	0.1	d
centi	0.01	c
milli	0.001	m

II.

1. B
2. B
3. C
4. D
5. C
6. A
7. D
8. B
9. A
10. D

III.

1. F
2. F
3. F
4. T
5. T
6. F
7. T
8. T

IV.

1. C
2. F
3. A
4. D
5. E

V.

1. litre
2. kilometre
3. centimetre/metre
4. grams
5. kilometre
6. Celsius
7. kilograms
8. litre

VI.

1. E
2. D
3. H
4. A
5. G
6. C

METRICS FOR PRESCHOOLERS

This unit is planned for preschoolers attending Nursery School and would take approximately five days to complete, depending on the progress and reaction of the children. However, the whole unit is not necessarily planned to be used consecutively. Instead the learnings should be taught where they best apply; for example, the information on degrees Celsius might best fit in with the weekly concept on fall during which we discuss how temperatures change with the seasons. Since repetition and reinforcement are vital experiences when teaching preschoolers, the metric concepts will be reviewed and used throughout the year in conjunction with appropriate activities.

Preschoolers have a very limited background in measuring by the customary system and probably no experience with the metric system. Most young children are aware of size as far as large versus small, tall versus short and heavy versus light is concerned. Since metrication will be a definite part of their lives, it is important to expose them to the metric system of measuring as early as possible to aid them in developing a positive attitude toward it.

Although preschoolers have a limited ability to grasp the techniques and details involved with measuring, they can be made aware of the basic terms and tools used with this new system. In addition to introducing them to the metric system and the fact that it is replacing our present system, this unit will give the children direct contact with basic concepts, terms, and tools used with metric measuring.

Through the teaching of this unit the preschoolers will not be the only ones to gain exposure to the metric system. High school students working at the Center will need to be oriented to this new way of measuring, so that they can assist with the planned activities for the unit. Also by way of handouts and seminars, the children's parents and other family members can be enlightened to metric thinking and encouraged to reinforce the unit's learnings at home with their preschoolers.

Teaching Aids

Bulletin board - "Our Metric Helpers"
(It will display the characters "Mighty Meter", "Great Gram" and "Silly Celsius").

Flannel board and felt letters

Metric Tree

Measuring tools:
- yardstick
- metre stick
- metric scales
- degrees Celsius outdoor thermometer
- degrees Celsius teaching thermometer

Evaluation: The children will be observed as they respond to the questions and discussions and as they participate in the various activities throughout the unit.

Directions for "Metre Cake": Prepare a regular boxed cake mix and bake according to the directions, in a 33 cm x 23 cm x 5 cm pan. When cool remove from pan and cut in thirds lengthwise. Arrange pieces end to end to measure 99 cm long. Frost the cake, being sure to add enough frosting at the ends to make the cake one metre long. Then decorate along the one top edge with short pieces of licorice to resemble the lines on a metre cake. Children can use a metre stick to check the length of the cake.

Metric System Verse:

The metric system is something new.
If I can learn it so can you. (children point to self and then to others)
Metres measure how tall we are (stand up tall and put hands on head to indicate height)
Or the length of a railroad car. (stretch arms out wide to indicate length)
Grams tell us how much we weigh
As we grow from day to day. (stretch arms out and up to indicate growth)

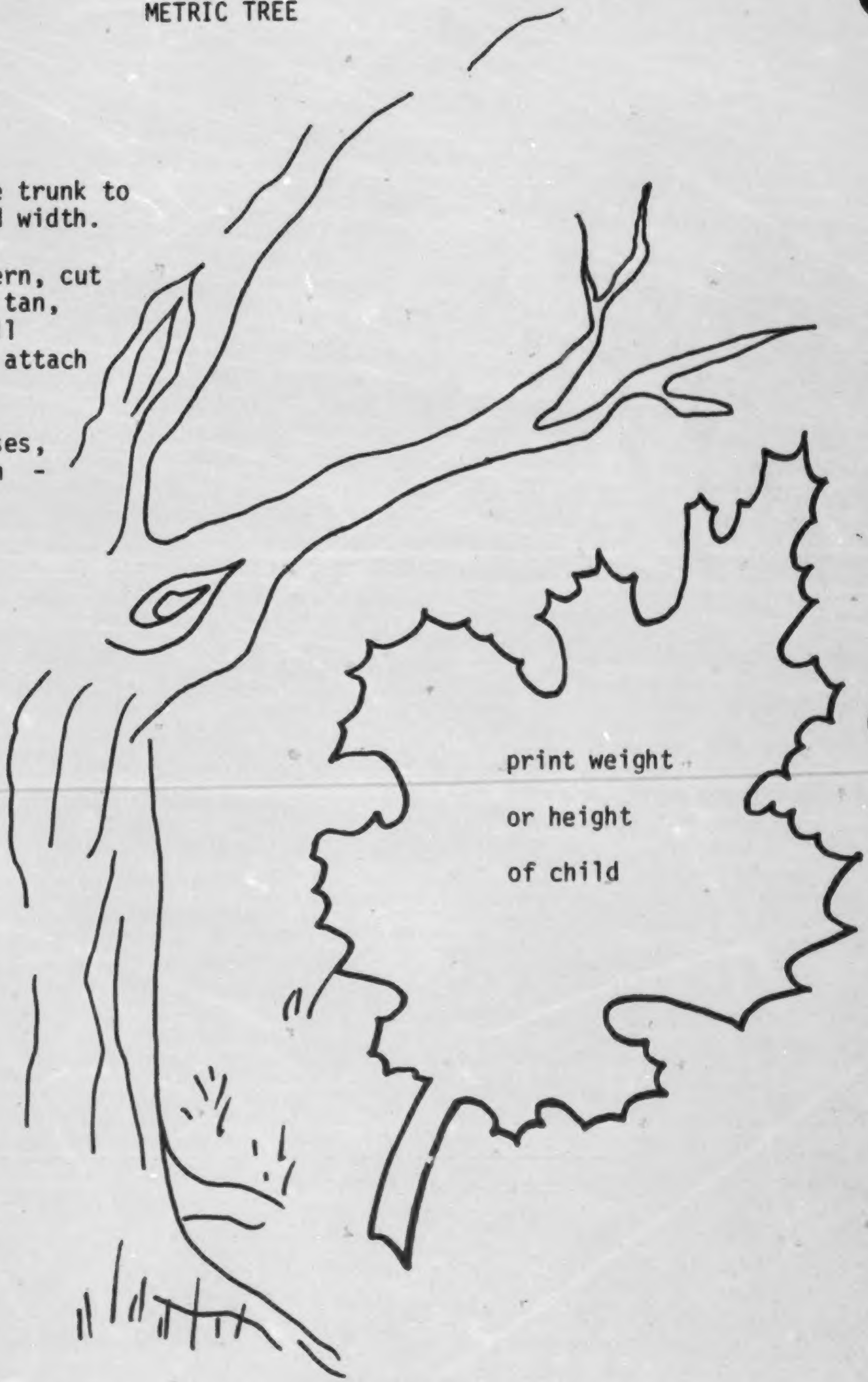
METRIC TREE

TO USE:

Enlarge the tree trunk to desired height and width.

Using leaf pattern, cut leaves from gold, tan, rust and other Fall colors. Children attach leaves to tree.

For Winter classes, substitute Snowman - with snowballs.


print weight
or height
of child

CONCEPTS:
1. Awareness of the metric system
2. Usefulness of the metric system
3. Exposure to basic metric terms and tools

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
		Have children stand up in a circle and look around at each other. Are we all the same size? Who is the tallest? Who is the shortest? What must we do to find out how tall or heavy we are?
After the introduction to the metric system, the student will accurately pronounce the term metric and verbally relate it with measuring.	The metric system is a new way to measure things.	Put the word metric on the flannel board and have the children name the letters in the word. Pronounce the word metric together.
	When we measure in metrics we use tools that are different from the ones we now use.	What tools could we use to measure how tall we are?
After discussing the metre, the student will correctly pronounce metre and verbally associate it with measuring length.	A metre stick measures how tall we are in metres.	Put the word metre on the flannel board and have the children name the letters in the word. Pronounce the word metre together.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
Having viewed and described the metre stick, the student will identify a metre stick by selecting it from among several measuring devices and stating its correct name.	A metre stick is different than a yardstick in that it is longer and has more numbers.	Show and compare a yardstick and a metre stick. Which is longer? How are the numbers and lines different?
	The metre stick measures the length or height of objects.	What are somethings in this room that we could measure with this metre stick? Measure various items with the metre stick.
After completing exercises involving the symbol for metre, the student will select from a group of letters the correct symbol for the term metre.	"m" is the symbol for metre.	Put the symbol m on the flannel board. What letter is this? Point to the word metre on the flannel board and ask "Do you remember what word this is?" What letter in this word is the same as the symbol m? Put several different letters on the flannel board including m's. The children select all the ones that are symbols for metre.
		Do you think you weigh more or less than one gram? Pass various objects around and discuss whether they are heavy or light.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After demonstrating the different types of metric scales, the student will match objects with the type of scale on which they could be weighed.	Different types of metric scales are used to weigh things depending on the size and how heavy the items are.	Show and demonstrate a balance scale, platform scale and a bathroom scale. Discuss what type of items could be weighed on each. Relate balance scale to how a see-saw works.
After completing exercises using the symbol for gram, the student will select from a group of letters the correct symbol for the term gram.	"g" is the symbol for gram.	Put the symbol on the flannel board. What letter is this? Point to the word gram on the flannel board and ask "Do you remember what word this is?" Where do we find the letter g in this word? Put several different letters in a bag. The children will take turns selecting a letter and then telling whether or not it matches the symbol for gram.
Following the discussion on the way to measure weight in the metric system, the student will participate in all the activities relating to the concept of the gram.	Application of basic metric principles to reinforce the above learnings.	The following plans for daily nursery school activities will carry out and review the metric concepts being taught. Snack time: Graham crackers will be served for snack. "Gram Crackers!"

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
After explaining the Celsius thermometer, the student will correctly pronounce the word Celsius and verbally associate it with measuring temperature.	The thermometer outside is a Celsius thermometer and it measures the temperature in degrees Celsius.	What does a thermometer measure? Put the word Celsius on the flannel board and have the children name the letters in the word. Pronounce the word Celsius together. Show and explain the Celsius teaching thermometer and compare it to the one outside.
Following practice with the Celsius teaching thermometer, the student will set it within three degrees of the outside thermometer reading in degrees Celsius.	The warmer the temperature the higher the red line will be and the colder the temperature the lower the red line will be.	Allow children to practice setting the teaching thermometer to various hot and cold temperatures.
After completing exercises invloving the symbol for degrees Celsius, the student will select the correct symbol for the term degrees Celsius.	°C is the symbol for degrees Celsius.	Put the symbol °C on the flannel board. What letter is this? Where is this letter found in the word Celsius? Put several different letters on the flannel board including C and c. Have children select all the ones that are symbols for Celsius. Also review what the m and g are symbols for.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
Having discussed the way to measure temperature in degrees Celsius, the student will participate in all the activities relating to the concept of degrees Celsius.	Application of basic metric principles to reinforce the learnings on degrees Celsius.	The following plans for daily nursery school activities will carry out and review the metric concepts being taught. Snack Time: The children will be served an iced drink and a hot dog wrap-up for snack. Art: The children will construct simple thermometers made from cardboard and ribbon, using pictures instead of numbers to indicate temperature reading. Science Table: The children will experiment with containers of hot and cold water and thermometers to see when the red line is high or low. Music: Sing songs about different types of weather and set the teaching thermometer accordingly. Calendar and Weather: Each day the children will check the outdoor thermometer and set the teaching thermometer to the same reading.

OBJECTIVES	SUPPORTIVE LEARNINGS	SAMPLING OF EXPERIENCES & EVALUATION
		Bulletin Board: Add the character "Silly Celsius" to "Our Metric Helpers" bulletin board.
		Story Time: Tell a flannel board story about "Mighty Metre", "Great Gram" and "Silly Celsius".
		Symbol Game: Children select a symbol (m, g, or °C) from a box and then tell whether the symbol relates to measuring length, weight, or temperature.

METRIC DOLL

1. Hi! I'm the metric doll. I suppose you want to know why you should metricate. You already know how many tablespoons are in a cup, ounces in a quart, pecks in a bushel, rods in a mile. . .

2. Oh? You don't know all of these? Relax, many people don't. That's why we are switching to the metric system. You'll soon find litres and grams easy to master.

3. The metric system is based on the number ten. Once you master the prefixes, it's simple. Liquids are expressed in litres, distance in metres, mass in grams and temperature in degrees Celsius.

4. You have the idea now! You are ready to communicate with the rest of the world. You see, the United States is one of the few countries not using the metric system at the present time. We will be gradually switching over the next 10 years.

5. Your height will be expressed in centimetres and your weight will be in kilograms. Your figure may measure 96-68-94!

METRIC DOLL

____ Tablespoons = 1 Cup

____ Ounces = 1 Tablespoon

____ Ounces = 1 Quart

____ Quarts = 1 Peck

____ Quarts = 1 Barrel

____ Pounds = 1 Ton

____ Feet = 1 Rod

____ Rods = 1 Mile

454 GRAMS = 1 POUND

1 LITRE = 1.05 QUARTS

10

1 KILOGRAM = 1000 GRAMS

1 HECTOGRAM = 100 GRAMS

1 DEKAGRAM = 10 GRAMS

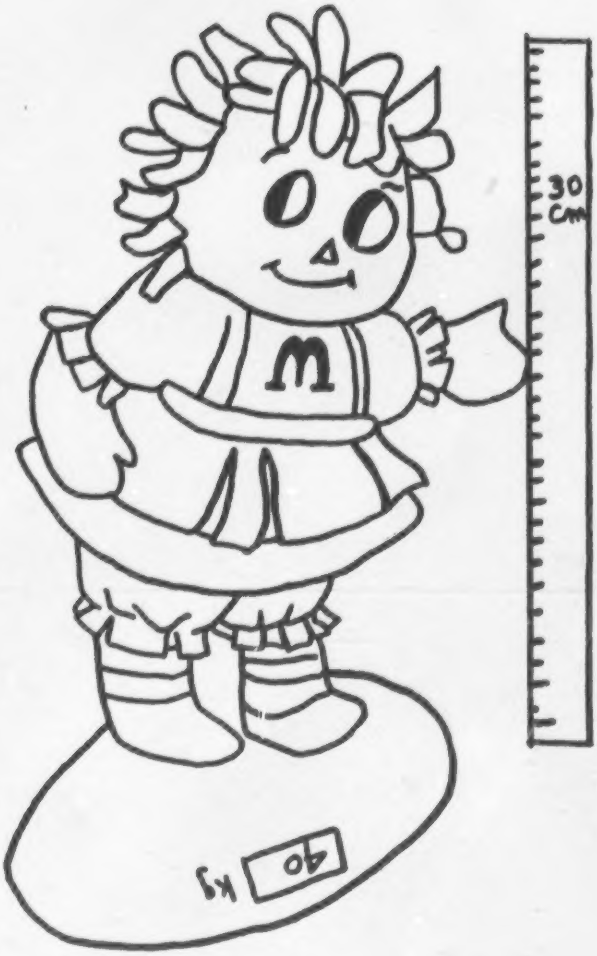
1 GRAM = 1 GRAM

1 DECIGRAM = 0.1 GRAM

1 CENTIGRAM = 0.01 GRAM

1 MILLIGRAM = 0.001 GRAM

Olé!


30 cm
M
40 kg

INTRODUCTION TO METRICS

1. The Droop will help you find ways of looking at the metric system. He hopes you will be able to recognize and use metric terms fluently. Because our present system of measurement is so cumbersome and has varying values, he knows you will find metrics very simple.

2. A major advantage of the metric system is its simplicity. The metric system progresses logically in units of 10. T-E-N! T-E-N! Go Ten!

3. The prefixes have the same meaning whether measuring length, area, liquid volume or mass. The basic units, as well as prefixes, are consistent. The names in our customary system - inch, yard, ounce, and pound, give no clue to any relationship.

   The larger units are: kilo - 1000 X
   hecto - 100 X
   deka - 10 X

   The smaller units are: deci - one tenth (0.1)
   centi - one hundredth (0.01)
   milli - one thousandth (0.001)

   There are seven basic units in the metric system. We will take a look at the most common ones.

4. First we have the metre. A metre is used in measuring length. It is a little longer than a yard. Distances will be measured in metres. Clothing sizes will be designated in centimetres.

5. The larger units are: 1000 metres = kilometre
   100 metres = hectometre
   10 metres = dekametre

   One metre is equal to: 10 decimetres
   100 centimetres
   1000 millimetres

6. Next is the litre. The litre is used for measuring volume. It is a little larger than a quart. Gasoline, milk and coke are just a few items to be measured in litres. The litre is a derived unit - not a basic unit.

7. The larger units are: 1000 litres = kilolitre
   100 litres - hectolitre
   10 litres = dekalitre

   One litre is equal to: 10 decilitres
   100 centilitres
   1000 millilitres

   Which is the largest unit? Which is the smallest unit?

8. A third unit of measurement in the metric system is the kilogram. This is the only basic unit with a prefix. Grams and kilograms are used for measuring weight or mass. One gram is about equal to the weight of a paperclip. Potatoes will be purchased by the kilogram. Your weight will be calculated by kilograms. Flour and sugar will be measured by grams.

9. Larger units of the gram are:
1000 grams = 1 kilogram
100 grams = 1 hectogram
10 grams = 1 dekagram

One gram is equal to:
10 decigrams
100 centigrams
1000 milligrams

Which is the heaviest unit? Which is the smallest?

10. The metric term for temperature is degrees Celsius. Normal body temperature is 37°Celsius, and a comfortable room would be 24°Celsius.

Water freezes at 0°Celsius, and boils at 100°Celsius.

11. The metric measurement for clothing is expressed in centimetres. A woman's size 12 in ready-to-wear will continue to be size 12, but the measurements will be 87-67-92 centimetres rather than 34-24-36 inches.

12. Major kitchen and home appliances and other large furnishings will be purchased in metric units. Service and replacement parts will be changed in the metrication process (tools, nuts, bolts, screws, etc.)

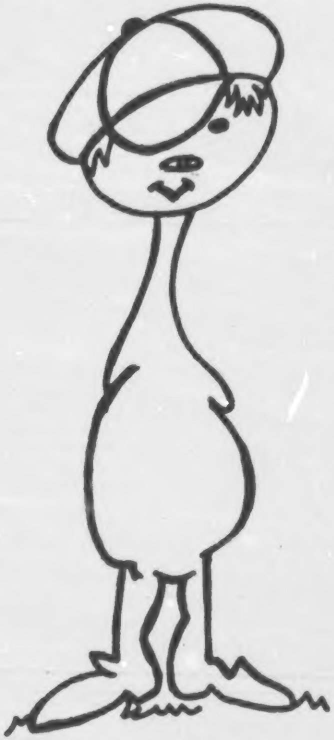
13. Using the metric system is as easy as using our monetary system. (Read and compare, using transparency).

14. Let's now join the Droop in a review. (Review and discuss, using the LENGTH, VOLUME and MASS transparencies with the overlay for prefixes and decimal equivalencies).

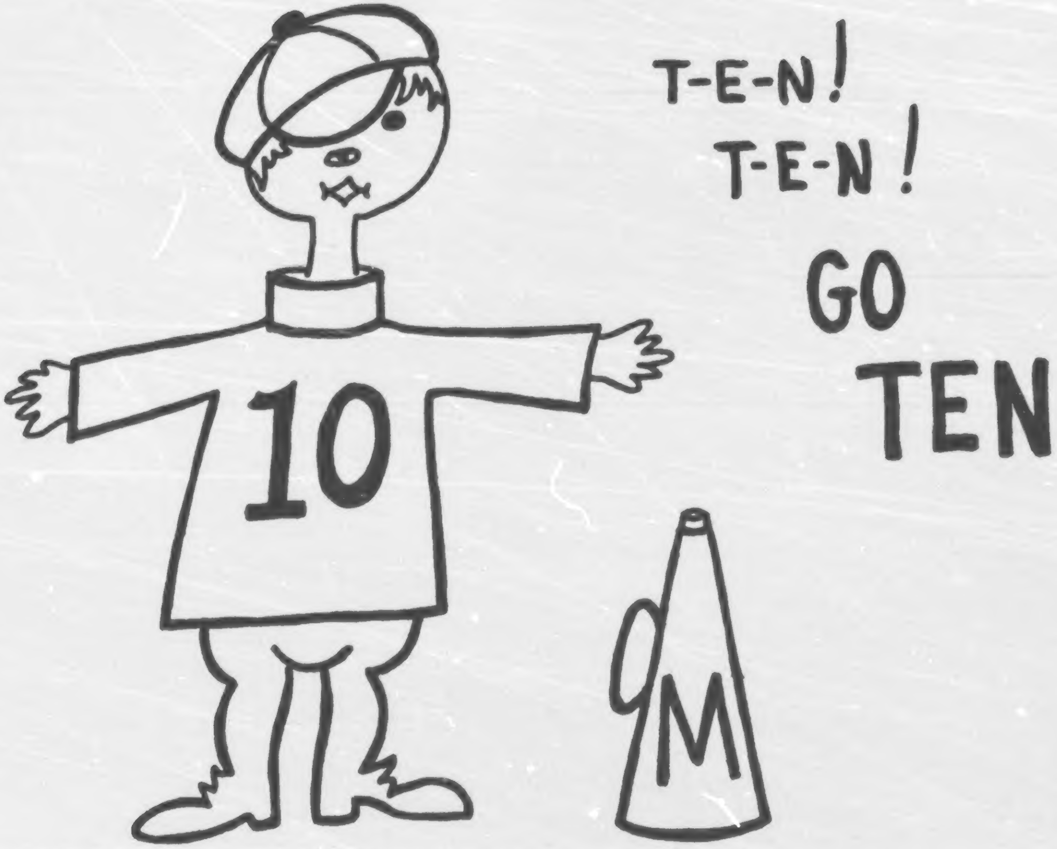
15. The metric system is a much simpler way to figure weights and measures. It coordinates measurements of length, area, volume and mass into one decimalized system. We don't have to change inches to feet or feet to yards, nor do we have to change ounces to pounds and pounds to tons. In metric, we just shift the decimal point, as we do in our monetary system. You will find the metric system a convenience.

So - get with the DROOP -- METRICATE.

INTRODUCTION
TO
METRICS



This is DROOP.


10
M
T-E-N!
T-E-N!
GO
TEN

deci - one tenth (0.1)

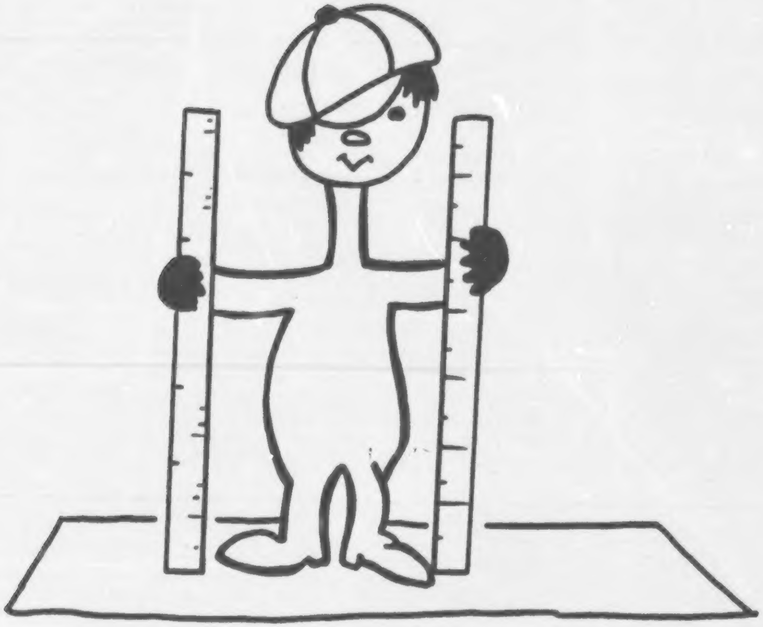
centi - one hundredth (0.01)

milli - one thousandth (0.001)

deka - ten times (10)

hecto - one hundred times (100)

kilo - one thousand times (1000)



This is a metre.

A metre is used for measuring length.
It is a little longer than a yard.

1000 metres = 1 kilometre

100 metres = 1 hectometre

10 metres = 1 dekametre

1 metre = 10 decimetres

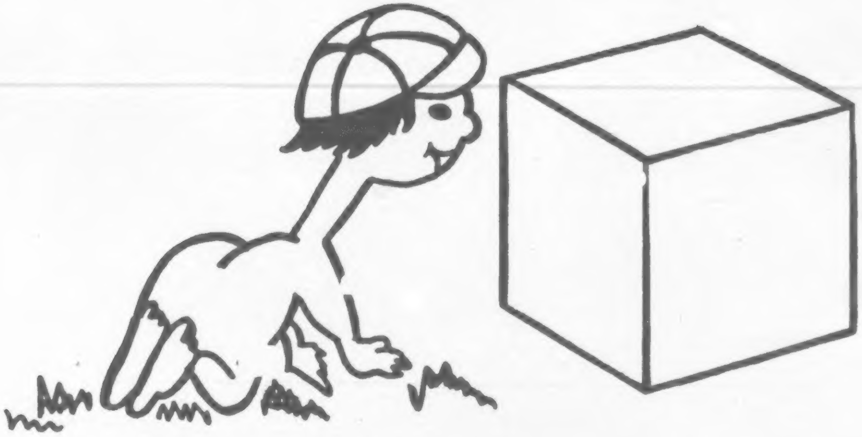
= 100 centimetres

= 1000 millimetres

180

181

This is a litre.



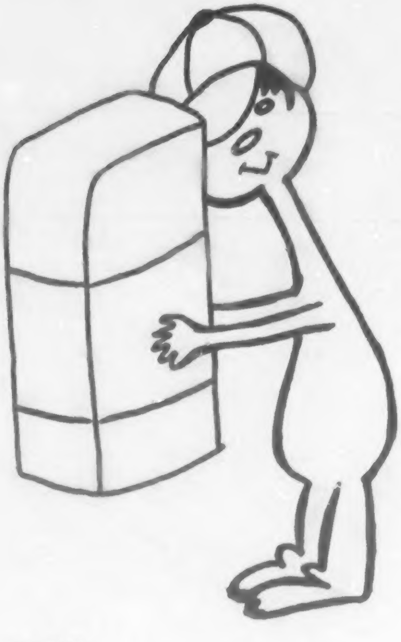
A litre is used for measuring volume.
It is a little larger than a quart.

1 litre = 10 decilitres
= 100 centilitres
= 1000 millilitres

10 litres = 1 dekalitre
100 litres = 1 hectolitre
1000 litres = 1 kilolitre

This is a kilogram.

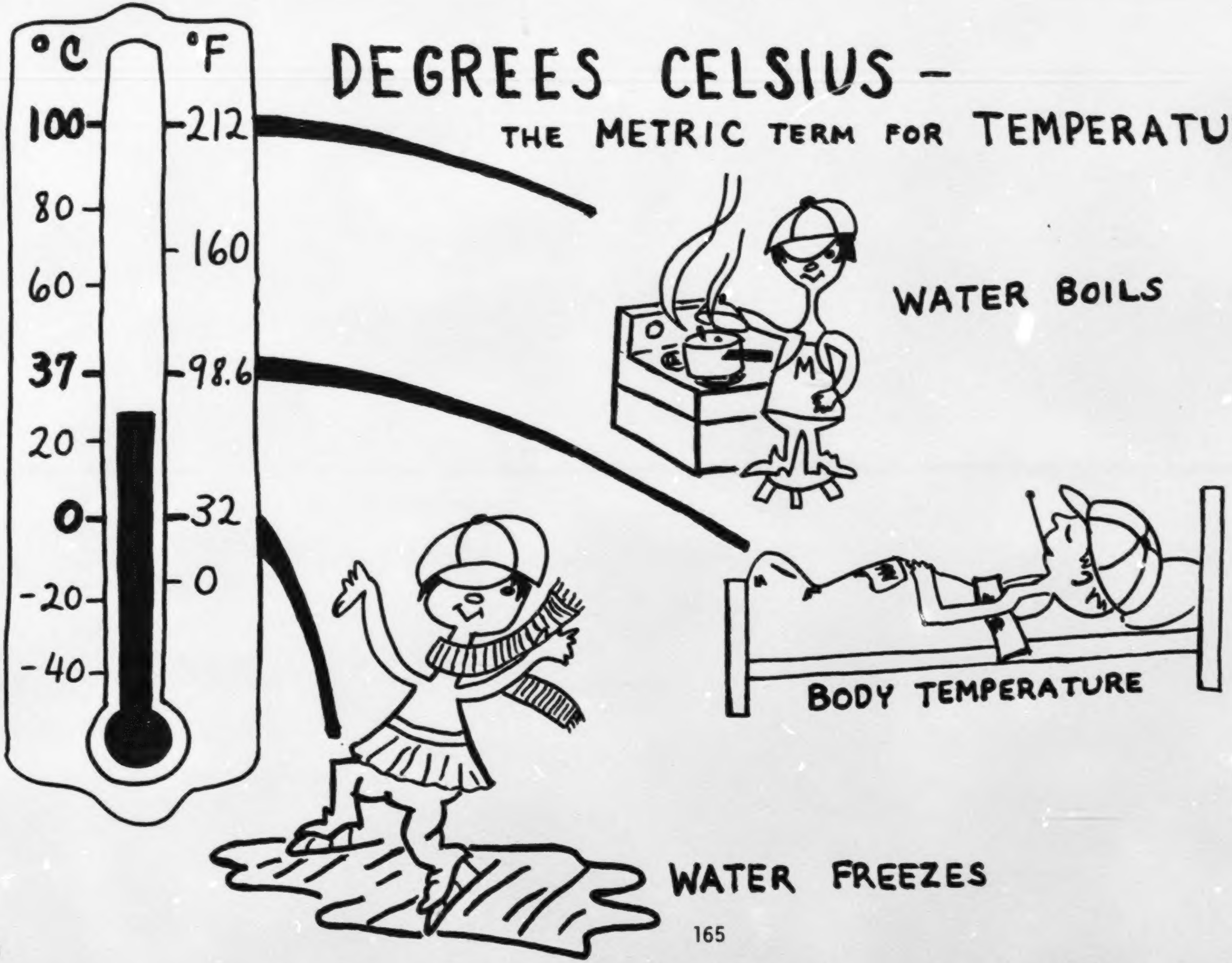
A kilogram is used for measuring weight or mass.

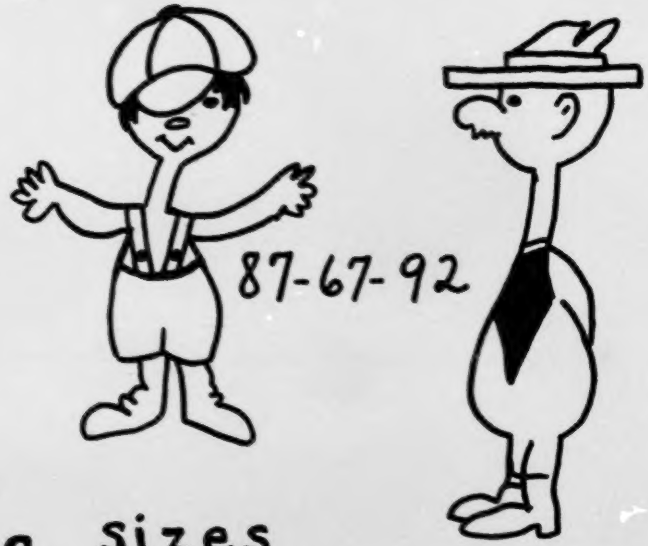


1000 grams = 1 kilogram
100 grams = 1 hectogram
10 grams = 1 dekagram

1 gram = 10 decigrams
= 100 centigrams
= 1000 milligrams

DEGREES CELSIUS –
THE METRIC TERM FOR TEMPERATURE

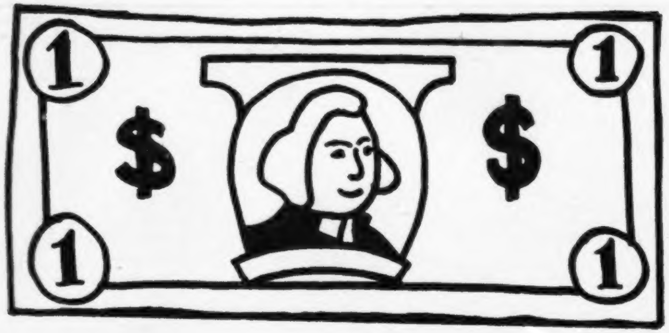

°C
°F
100
212
80
160
60
37
98.6
20
0
32
0
-20
-40
M
WATER BOILS
BODY TEMPERATURE
WATER FREEZES



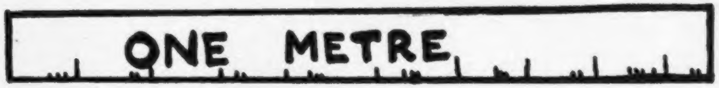
Clothing sizes
will be expressed in centimetres.

Metrics
will be used in
home furnishings,
appliances, and
equipment.

IF



=



THEN

10 dimes = 10 decimetres

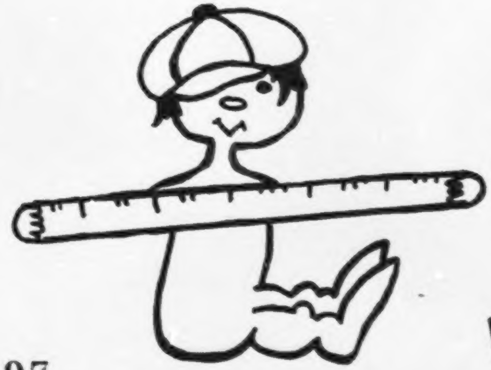
100 cents = 100 centimetres

1000 mills = 1000 millimetres

LENGTH

METRE
METRE
METRE
METRE
METRE
METRE
METRE

METRES
METRES
METRES
METRE
METRE
METRE
METRE



How many metres can you stretch your arms?

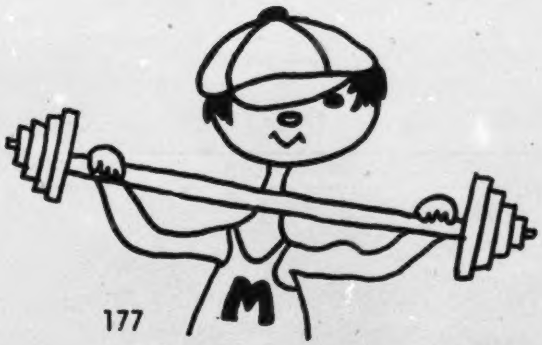
VOLUME

LITRE	LITRES
LITRE	LITRES
LITRE	LITRES
LITRE	LITRE
LITRE	LITRE
LITRE	LITRE
LITRE	LITRE

How many litres are in a bottle of cake ?

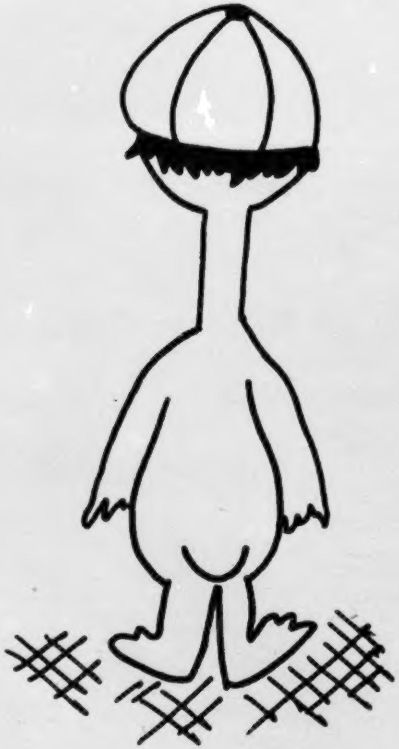
MASS

GRAM GRAMS
GRAM GRAMS
GRAM GRAMS
GRAM GRAM
GRAM GRAM
GRAM GRAM
GRAM GRAM



How many kilograms can you lift?

1 kilo = 1000
1 hecto = 100
1 deka = 10
1 = 1
1 deci = 0.1
1 centi = 0.01
1 milli = 0.001



A FINAL WORD... **METRICATION!**

GAMES

METRE MAID GAME

There are 20 pairs of cards and one picture of the METRE MAID for this game. A pair is two cards which are equivalent in metric value. After shuffling the cards, deal one at a time until all cards are distributed. A person is needed to act as referee, checking each pair for accuracy before the player may put that pair down on the table. After the cards have been dealt, each player is to match as many pairs as possible within the hand.

The dealer draws a card from the player on his right. If it matches with a card in his hand, the pair is placed on the table. The player on the dealer's right then chooses a card from the person on his right and play continues in the same manner.

The game continues until all pairs are matched, leaving one person holding the METRE MAID card. The winner is the person who has the most matched pairs. This person may act as dealer for the next game.

Examples for 20 pairs: (s = symbol)

centimetre (s = cm)
hectometre (s = hm)
1 metre = 39.37 inches
millimetre (s = mm)
decimetre (s = dm)
kilometre (s = km)
metre (s = m)
centi means 1/100
milli means 1/1000
deci means 1/10

metre= unit of length
deka means 10 x
hecto means 100 x
kilo means 1000 x
10 dm = 1 m
1 km = 10 hectometres
10 mm = 1 cm
10 dam = 100 m
0.001 m = 1 mm
0.01 m = 1 cm

NOTE: METRE MAID can be made into decks for learning volume and mass by substituting the equivalent cards to make LITRE MAID or GRAM MAID.

METRIC MILLY CARD GAME

PROCEDURE: Played similar to Old Maid with 2-4 players. After the deck of 53 cards are dealt, the player to the dealer's left begins the game. Each person in turn selects a card from the player on his left and tries to make a pair. The game continues until all cards have been matched and one player is left with the METRIC MILLY card. A referee holds the master list of question and answers to check pairs that are laid down.

OBJECTIVE: Players must match a question card with its correct answer card.

SCORING: Each correct pair that is laid down is scored as 2 points. Player with highest number of points wins the game.

MASTER LIST

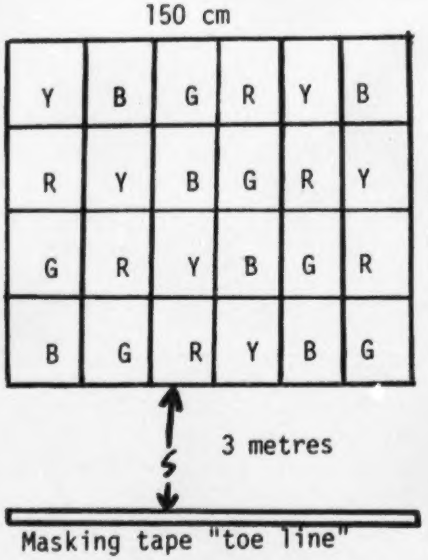
(Each of the following are to be printed on a card to make a deck of 53 cards)

	QUESTIONS	ANSWERS
1.	A gram is a measure of	weight
2.	A litre is a measure of	liquid volume
3.	A metre is a measure of	length
4.	A centimetre equals	1/100 metre
5.	The letter g symbolizes	gram
6.	A kg equals	1000 grams
7.	A kilogram equals	2.2 pounds
8.	A litre equals	1.06 quarts
9.	A metre equals	39.37 inches
10.	One pound equals	454 grams
11.	In the word centimetre, the prefix centi means	1/100 of a metre
12.	Celsius is the unit of	temperature
13.	Water boils at ____°C	100°C
14.	Water freezes at _____°C	0°C
15.	One teaspoon equals	5 ml
16.	One cup equals	250 ml
17.	One tablespoon equals	15 ml
18.	One inch equals	2.54 cm
19.	Deci means	1/10
20.	Hecto means	100 times
21.	Deka means	10 times
22.	Milli means	1/1000
23.	Kilo means	1000 times
24.	Centi means	1/100
25.	A 5/8" seam allowance on a pattern equals	1.5 cm
26.	On the Celsius scale, body temperature equals	37°C
27.	METRIC MILLY	

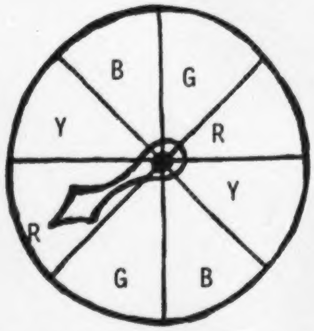
MORE DIFFICULT PAIRS

1.2 cm	12 mm	3 cm	30 mm
10 cm	1 dm	50 cm	500 mm
100 cm	1 m	150 cm	1.5 m
125 cm	1.25 m	300 cm	3 m
1000 m	1 km		

HECTIC METRIC GAME



Y	B	G	R	Y	B
R	Y	B	G	R	Y
G	R	Y	B	G	R
B	G	R	Y	B	G



Make spinner from cardboard.
Cut arrow from side of margarine tub.
Attach arrow with a brass brad.

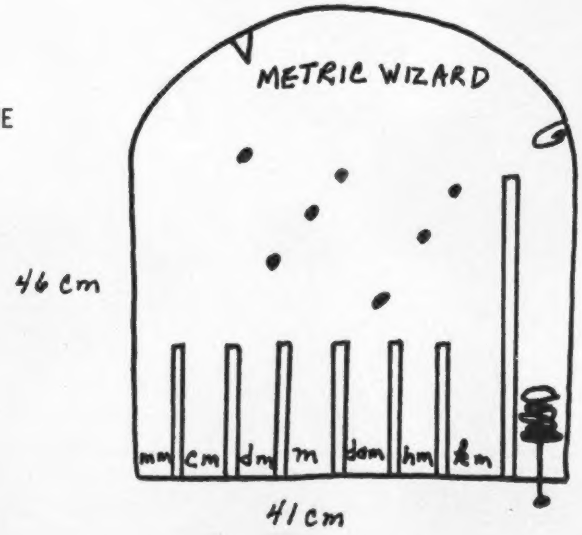
SUPPLIES NEEDED:
- Spinner with 4 colors on dial face
- Crayon-batiked sheet 150 cm x 100 cm
  - squares are 25 cm x 25 cm
  - colors arranged as indicated in diagram
- Bean bag app. 16 cm x 11 cm
- Question cards 8 cm x 13 cm
  - at least 16 of each color (yellow, green, red, blue)
  - point system: yellow or green = 5 points
    red or blue = 10 points
- Masking tape to hold edges of sheet in place on floor and for "toe strip" for player to stand behind.

OBJECT: Throw bean bag onto colored square on sheet which matches color shown on spinner. Answer metric question with same color-coding for point value shown on card.
Recommended number of players is 4. Points may be tallied individually or as teams (2 players each on two teams).

RULES:

1. Spin dial. Person stands behind tape line 3 m away from sheet.
2. Person throws bean bag attempting to land on corresponding color of square on sheet. Limit of 2 tries per turn.
3. If bean bag lands on corresponding colored square, the person is asked a metric question of the same color. (Another person reads the question aloud, since the answers are marked on question cards.)
4. Person answering metric question correctly receives designated number of points shown on card.

METRIC WIZARD GAME



SUPPLIES:

1. Pinball-type playing board - dowel rods used as bumper pegs
   - 7 metric slots in graduated form
   - spring-loaded plunger
2. 7 marbles
3. Score pad and pencil

OBJECT:

1. Interpret metric symbols
2. Convert each scored metric symbol to a metric metre decimal on score pad
3. Find the sum (in metres) of the 7 marble scores.

RULES:

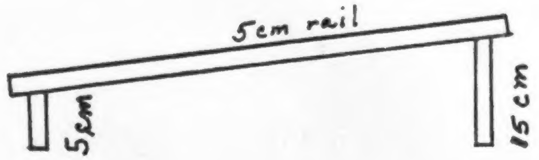
1. Player shoots all seven marbles (one marble at a time).
2. Record the 7 metric symbols in which the marbles land on the tally tab. Each marble represents 1 unit of measure for the appropriate slot.
3. Convert the metric symbols into metric metre decimals.
4. Player then adds the 7 metric metre decimals.

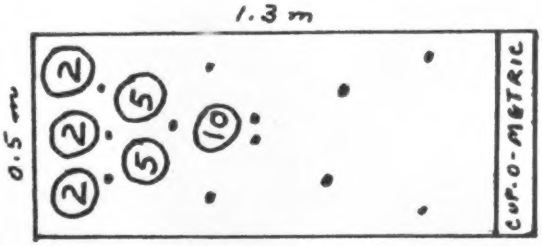
For example, if the seven marbles fall in slots as follows:

1. dm = 0.1
2. cm = 0.01
3. cm = 0.01
4. km = 100
5. km = 1000
6. m = 1
7. m = 1

The total is 1102.12 metres

Cup-O-Metric Game





SUPPLIES:

1. Table - approximately 1.3 m x 0.5 m
    - six holes (arranged as shown in diagram above) 10 cm diameter
    - 5 cm retainer rail around table
    - dowel rods used as bumper pegs
    - table is mounted on a slant downward toward tubs
2. 6 margarine tubs inserted into table holes (graduated point system: 1 for 10 pt., 2 for 5 pt., 3 for 2 pt.)
3. 4 ping-pong balls
4. assorted metric questions on discs of paper (to be placed in the tubs)
5. scoring pad and pencil

Recommended number of players = 4. Points may be tallied individually or as two teams (2 persons per team).

OBJECT:

Roll ball into a cup. Top question is read from cup in which ball lands. Answer question to receive point value of that cup.

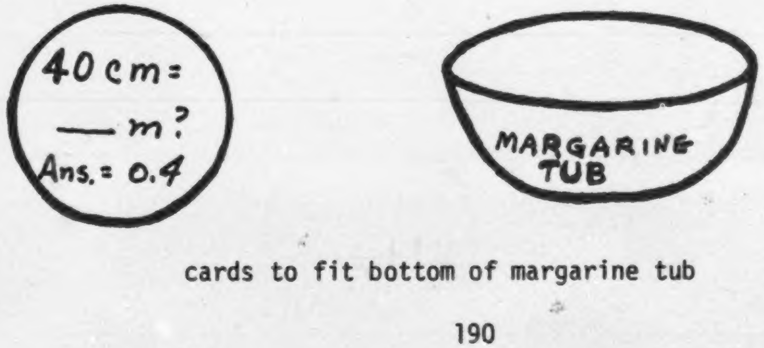
RULES:

1. Player rolls one ball. Another person reads aloud the question from the top card inside that particular cup. (Answers are on cards.)

2. If question is answered correctly, person receives score indicated on cup. Card is removed from game.
   If question is answered incorrectly, card is placed on the bottom of the cards in that cup.

3. If a cup is deplenished of its questions, card discs may be taken from another cup.

4. At no time should the table be bumped or shaken to change the direction of the ball.



cards to fit bottom of margarine tub

SAMPLE QUESTIONS FOR HECTIC METRIC AND CUP-O-METRIC

I. Easier questions: (Yellow)

1. The symbol c stands for which metric prefix? (centi-)
2. Prefix meaning one thousandth. (milli-)
3. What is the metric symbol for the prefix deka? (da)
4. 1 kilogram is how many grams? (1 000)
5. How is 1 decimetre written as a decimal? (0.01 m)
6. The _______ is a measure of length. (metre)
7. A metre equals _____ cm. (100)
8. ________ shall replace inches. (centimetres)
9. The metric base unit for volume is _____ (litre)
10. Temperature is measured in _____ (°Celsius)
11. If 3 metres contain 300 cm, 6 metres contain _____ cm. (600)
12. A mm is the same as _____ (give fraction) of a metre. (1/1 000)
13. How is 1 mm symbolized as a metric decimal? (0.001 m)
14. What is the name given to the metric system you are learning? (SI) (Systeme International)
15. Which is smaller a centimetre or a decimetre? (centimetre)
16. One litre contains _____ ml. (1 000)

(Green)

1. What is the prefix meaning 1/10 of a metre? (deci-)
2. Hecto- means times _____. (100)
3. k is the symbol for the metric prefix _____. (kilo-)
4. The metre is the unit of measure for _____. (length)
5. A centimetre is what part of a metre?- fraction. (1/100)
6. The metre replaces the _____. (yard)
7. Is there a period after 2 m? (no)
8. _____ shall replace miles. (kilogram)
9. Metric unit for mass? (gram)
10. A decimetre is divided into ten equal parts. Each part is called a _____. (centimetre)
11. Name one item for which the metre would be too long a unit for measuring. (ex.: pencil, scissors, etc.)
12. Dekametre means ten times a _____. (metre)
13. Approximately how wide is your little fingernail? (1 cm)
14. Approximately what is the span of your hand from thumb to little finger expanded? (20 cm)
15. Which is longer, a metre or a yard? (metre)
16. In the metric system, is a pin measured in inches? (no; cm)

II. Harder questions: (Red)

1. How is 24 centimetres written as a decimal with a metric symbol - metres? (0.24 m)
2. Instead of telling the lady in a store that you want 'so many' yards of fabric, you will say 'so many' _____. (metres)
3. A new pencil is approximately _____ cm long. (20 cm)
4. 4 m 2 dm is expressed as _____ m. (4.2)
5. The metric system is written in base _____. (10)
6. To change metres to decimetres which way do you move the decimal? (right)
7. 1.9 cm = _____ mm. (19)
8. 2 kilometres = _____ metres. (2 000)
9. Name one measurement (base unit) which will not change as the U. S. converts to metrics. (ex.: money, time)
10. 1 mm + 1 mm = _____ m. (0.002 m)
11. What is used in place of a comma to show groups of digits when writing 1,000 in metrics? (a space)
12. 0.9 m = _____ cm. (90 cm)
13. 40 cm is _____ metres. (0.4)
14. Which is shorter: 1/2 yd. OR 0.5 m? (1/2 yd.)
15. Name one item, industry, or field in the U. S. which presently uses metrics. (ex.: chemistry, pharmacies, sports, film, etc.)
16. The _____ is used instead of calorie. (Joule)

(Blue)

1. We measure the body in inches; what metric measure is used? (centimetres)
2. 7 m 3 cm is expressed in decimal metric terms as _____ m. (7.03 m)
3. 1 m + 1 dm = _____ m. (1.1)
4. How many dekametres are in a hectometre? (10)
5. Which is longer, a cm or an inch? (inch)
6. 1 dam + 1 dm = _____ m. (10.1)
7. 2 m = _____ mm. (2 000)
8. 4 m = _____ km. (0.004)
9. Helen's poodle weighs 5 kg. If he has doubled his weight since last year, how much did he weigh last year? (2.5 kg)
10. One inch is closest to: 2.5 mm; 2.5 cm; 2.5 dm. (2.5 cm)
11. 1 000 times a metre = _____. (kilometre)
12. 9 mm + 3 mm = _____ cm. (1.2 cm)
13. Should you leave a space between the c and the m when writing cm? (no)
14. Is 45 metres symbolized as 45 ms? (no; 45 m)
15. dam = the da is for _____. (deka)
    the m is for _____. (metre)
16. The metric unit used to measure land area is _____. (hectare)

Centi - mental Fun

To measure in metrics is oodles of fun,
We'll begin with a cent to show how it's done.

Let's measure ten pillars. I know you'll agree
They measure a centimetre. It's easy, you see!

The top of the memorial is, you'll find,
Another centimetre to keep in mind.

And now let's measure the man on the face
From shoulder to shoulder, down at the base.

You guessed it already? You weren't surprised?
It seems that you, too, have been "centi-mentized".

GIVE US THIS DAY ...

According to requirements of the Basic Four
Adults need ______ ml of milk or more. (500)

Four servings of fruits and vegetables are fine
If you include _____ ml of citrus when you dine. (125)

The recommended number of grams for meat
Would equal _____ for you to eat. (112 woman-55 grams)

Four slices of bread, we readily learn,
Provide _____ kilojoules to burn. (1170)

A 58 kilogram woman would, we may say,
Include ______ kilojoules in her diet each day. (8400)

BULLETIN BOARD SERIES
(SKETCH FORM)

INTRODUCTION TO METRICS

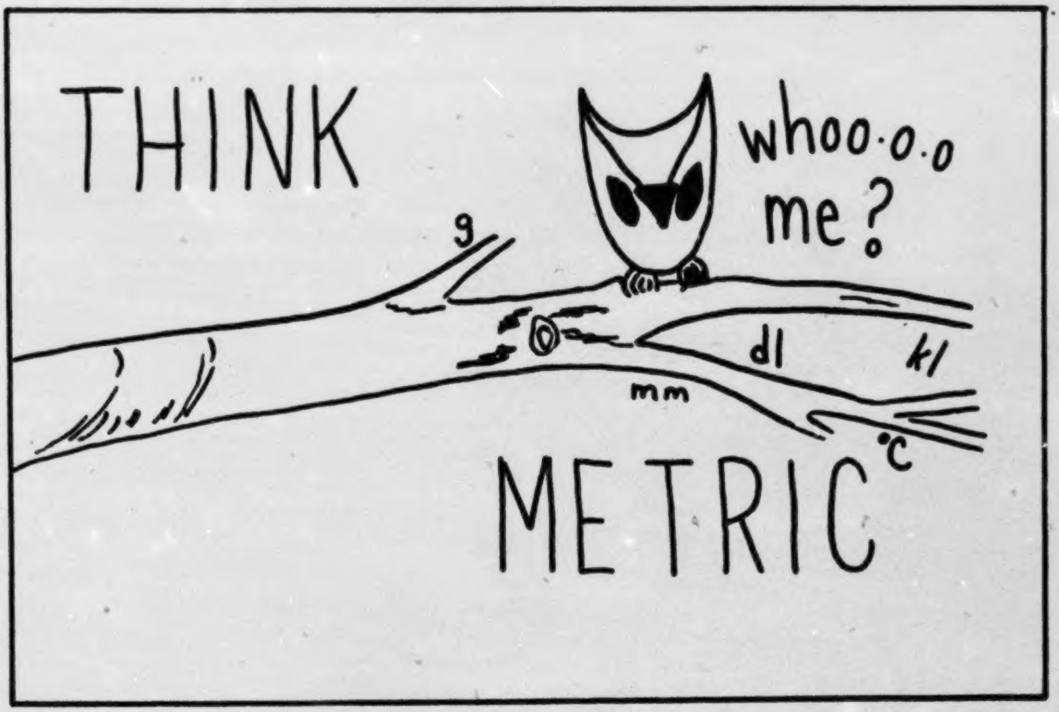
1

HAVE YOU HEARD . . . ?

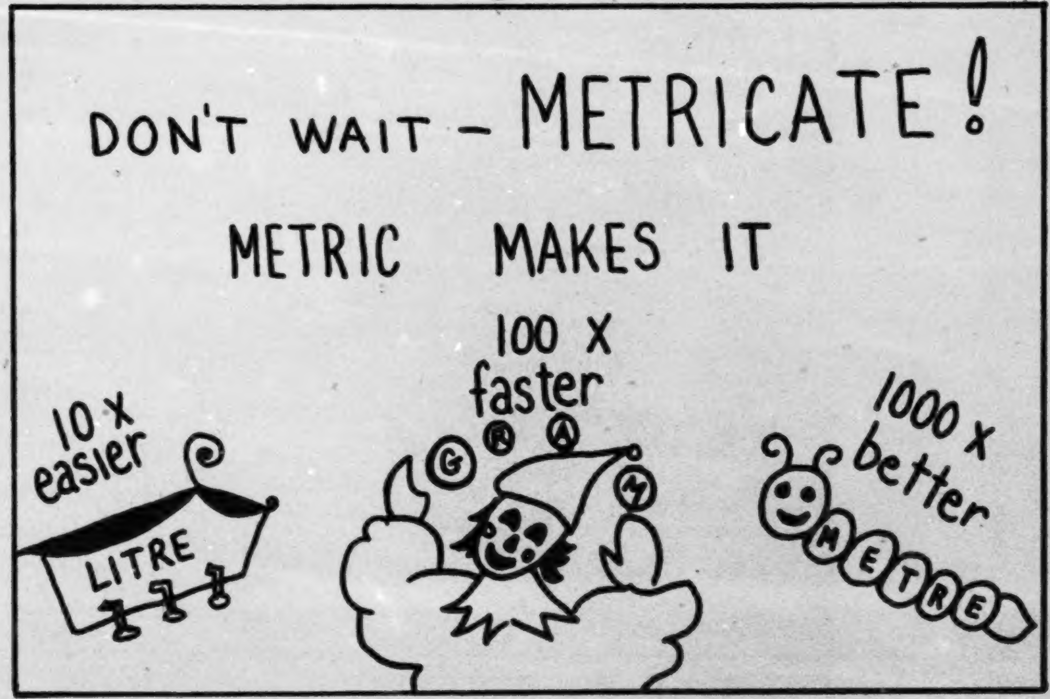
Soon we'll measure length in metres,
Buy our juice and milk in litres,
Weigh ourselves and beef and ham
On scales that use the kilogram.

And all the cars' speedometers
Will measure in kilometres.
For any small or large amounts
The metric system is what counts.

2

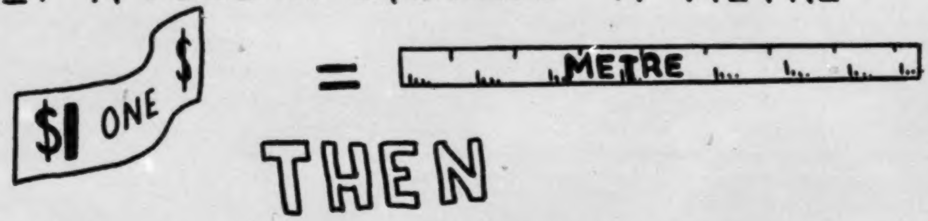

THINK
whoo·o·o
me?
g
dl
kl
mm
°C
METRIC

3

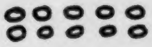

DON'T WAIT – METRICATE!
METRIC MAKES IT
100 X
faster
10 X
easier
1000 X
better
LITRE
G R A M
METRE

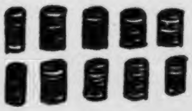
4

IF A DOLLAR EQUALLED A METRE –



THEN


10 DIMES = 10 DECIMETRES

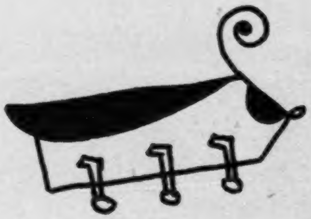

100 CENTS = 100 CENTIMETRES

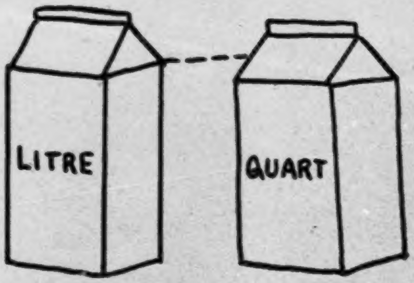
1000 MILLS = 1000 MILLIMETRES

5

BECOME A

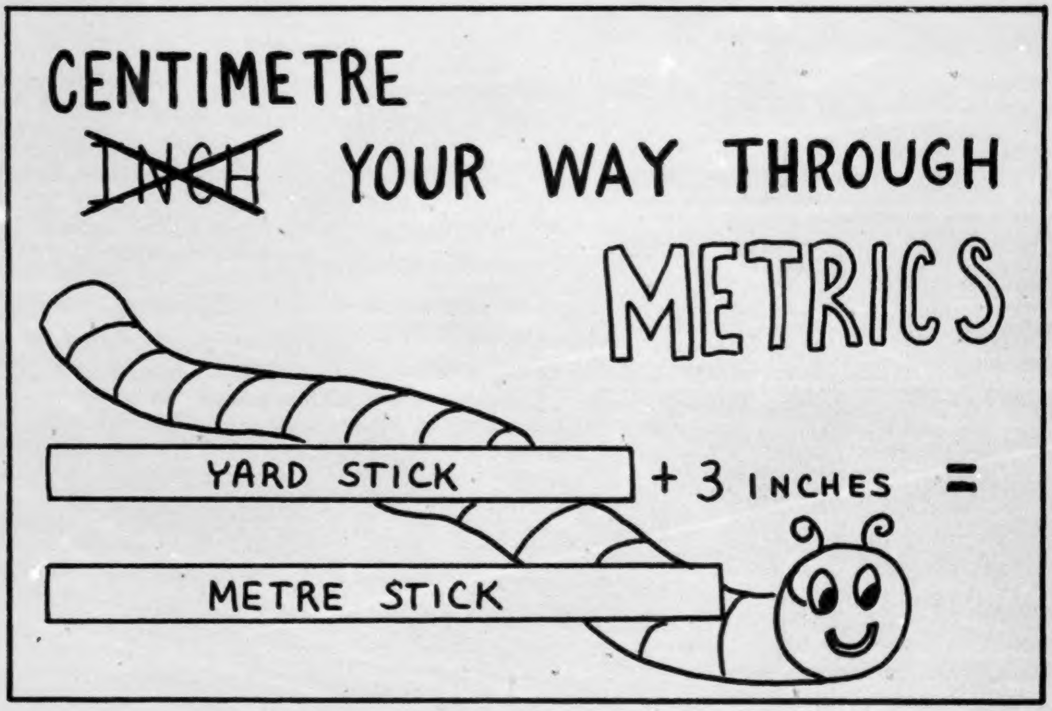
LITRE BUG



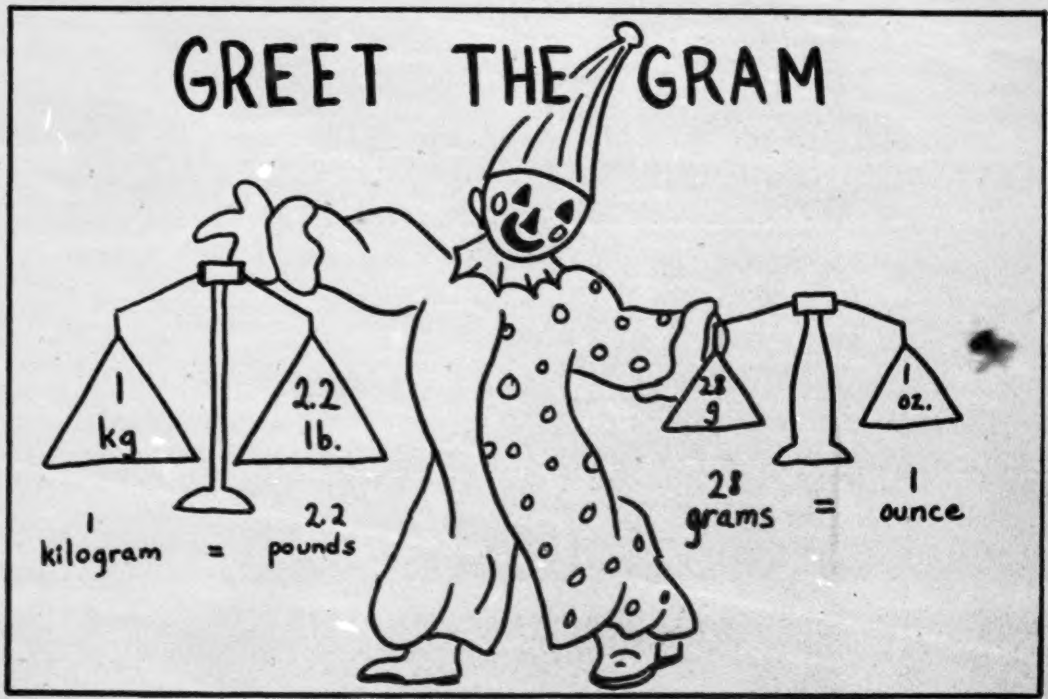

LITRE
QUART

1 litre = 1 quart plus 1/3 cup

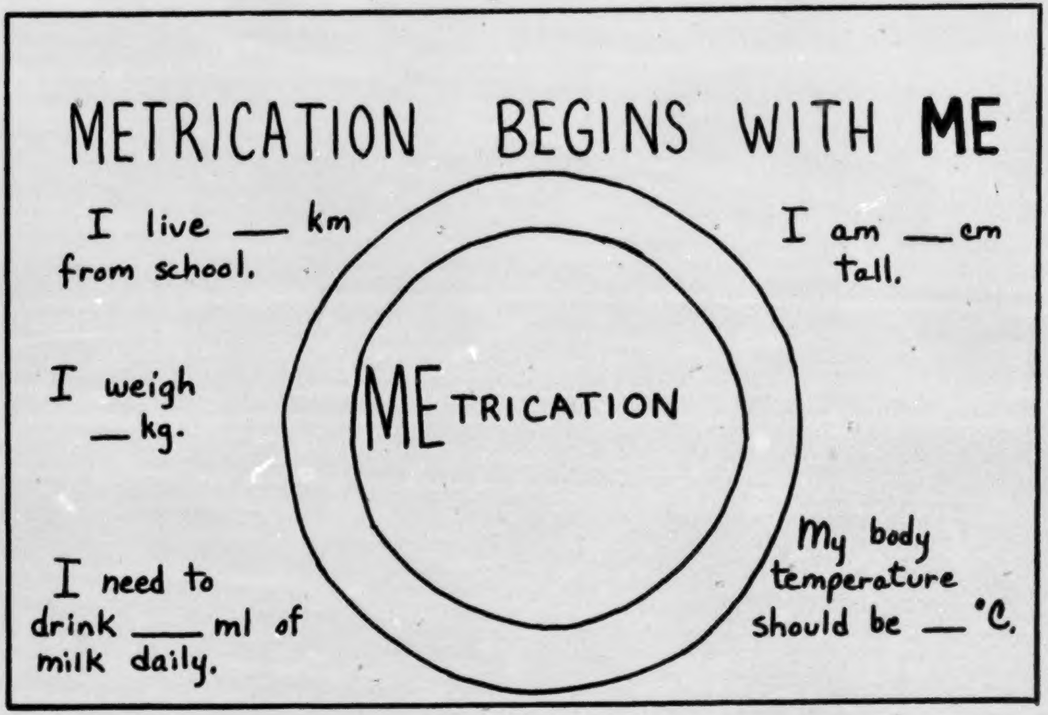
6


CENTIMETRE
~~INCH~~ YOUR WAY THROUGH
METRICS
YARD STICK
+ 3 INCHES =
METRE STICK

7


GREET THE GRAM
1 kg
2.2 lb.
1 kilogram = 2.2 pounds
28 g
1 oz.
28 grams = 1 ounce

8


METRICATION BEGINS WITH ME
METRICATION

I live ___ km from school.

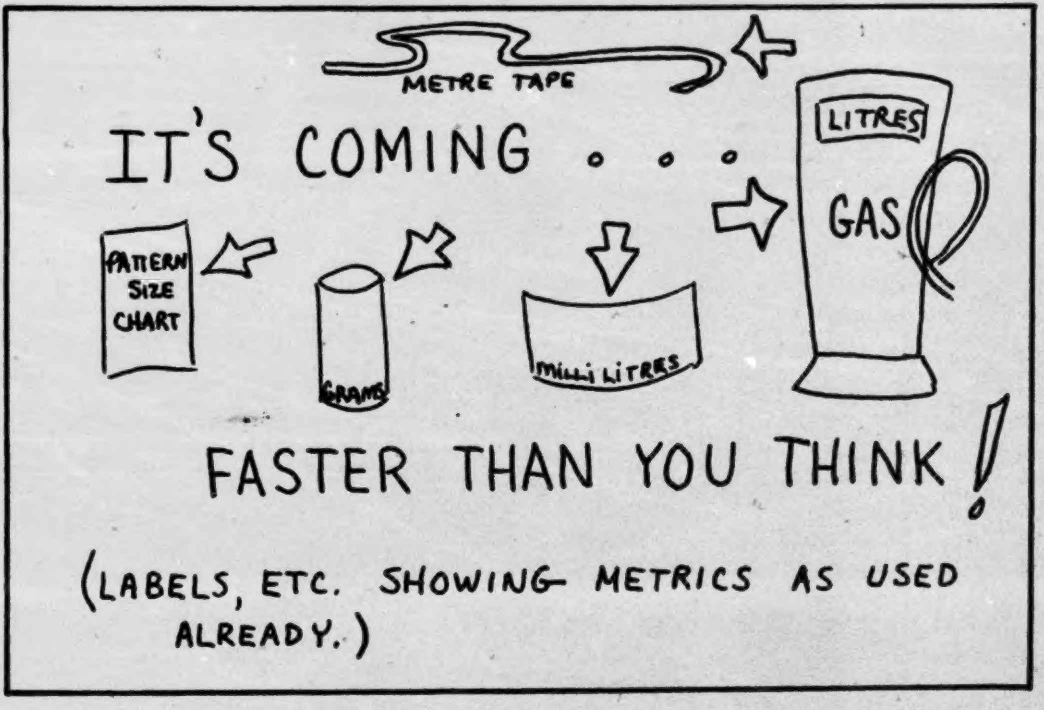
I am ___ cm tall.

I weigh ___ kg.

I need to drink ___ ml of milk daily.

My body temperature should be ___ °C.

9


METRE TAPE
IT'S COMING . . .
LITRES
GAS
PATTERN SIZE CHART
GRAMS
MILLI LITRES
FASTER THAN YOU THINK!

(LABELS, ETC. SHOWING METRICS AS USED ALREADY.)

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Contains history of measurement, explanations of units comprising the International System, problems, solutions, and conversion tables.

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Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
Contains bibliographic and ordering information for metric publications of the National Burauu of Standards and the American National Standards Institute (ANSI).

All You Will Need to Know About Metric (For Your Everyday Life). Free
Letter Circular No. 1052
Metric Information Office
National Bureau of Standards
Washington, DC 20234
Illustrates basic metric information. Emphasizes metre, litre, gram, degrees, Celsius, and the use of common prefixes: milli-, centi-, and kilo-.

Armaquac, A.P."New Push for the Metric System: Will You Give Up Pounds, Feet and Inches?" Popular Science. 194:54-74, 1969.

Armbruster, R.O. Think Metrics. 1974, 39 p. $1.50, paper, Order No. 1501
Troubador Press
126 Folsom Street
San Francisco, CA 94105
"Think Metric" student workbook with practical and novel introduction to metrics for daily use. Humorous, cut-outs for self-study flashcards, making metre sticks and litre cylinders. Evaluation and answers.

"At Home With Metric Measuring," Butterick Publishing Co.
P. O. Box 1945
Altoona, PA 16603
Multi-media package includes filmstrip, cassette tape, guide, activity sheets, 2 wall charts, metric measuring tools. #75.00 plus postage and tax.

Bailey, J.H. "Farewell to the Barleycorn Inch." Science Digest. 69:26-30, January 1971

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Barbrow, Louise E. What About Metric? National Bureau of Standards, 1973,
16p. $.80, paper Stock No. 0303-01191
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
Booklet on metric measurement for consumer and homemaking related tasks. Includes charts for estimating household measurements and comparing U.S. customary and SI metric systems. Measurement problems included.

Batcher, Olive M and Louise A. Young. "Metrication and the Home Economist," Journal of Home Economics, Feb. 1974, 66(2), 28-31.

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$1.50, paper
Carole Bielefeld
Orange County Department of Education
P. O. Box 11846
Santa Ana, CA 92711
Workbook in consumer and homemaking education. Includes: brief history of metric system, transparency presentation with narration on length, volume, and mass(weight), learning-by-doing exercises with pre-test and post-test.

Dowles, D. Richard. "Get Ready for the Metric System," Instructor, Vol. 81 (December 1971), pp. 69-70.

Branley, Franklyn M. Think Metric! 1972, 53 p. $4.50
Thomas Y. Cromwell Co.
666 Fifth Avenue
New York, NY 10019
Book in large print (for grades 5-8). Metric exercises.

Brief History of Measurement Systems with a Chart of the Modernized Metric System. Rev. 1972, 4 p. $.30 SD Catalog No. C13.10:304A
The Modernized Metric System (wall chart: 74 x 114cm, color) is also available for $.55, SD Catalog No. C13.10:304
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
Chart, available in desk and wall sizes; present seven basic metric (SI) units of measure with related graphics, formal definitions, tables of common conversions from customary measure to metric units and vice versa, and table of metric prefixes.

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Midwest Publications Company, Inc.
P. O. Box 129, 1700 West Maple Road
Troy, MI 48084
Metric experiments and activities in a workbook with tear-out sheets at no read, low read, medium read and high read levels.

Buckeye, Donald A. Introducing the Metric System with Activities. 1972, 26 p. $1.50, paper
Midwest Publications Co., Inc.
P. O. Box 129
Troy, MI 48084
Field tested workbook with 50 activities for small group, individual, or classroom instruction. Discovery or inquiry oriented.

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Consumable booklets for grades 3-8.

Cherrington, Don. Metric Workshop for Teachers. 1974, 32 p., $2.50, paper
Willow House Publishers
P. O. Box 129
Stockton, CA 95201
Cherrington-Fearon-Massey Series of Six Metric Books, Book 6: Teacher Training
Complete series of 6 books is available for $12.00
Student workbook, activity guide, and instructor's manual using "Think Metric" strategy. Designed for elementary in-service teachers, it lists objectives, materials and activities. Self directed and self paced. Adaptable to higher level.

Clack, Alice A. and Carol H. Leitch. Amusements in Developing Metric Skills. 1973, 47 p., paper, $3.75
Midwest Publications Company, Inc.
P. O. Box 129, 1700 West Maple Road
Troy, MI 48084
Workbook dealing with metric units of linear measurement, area, mass, volume, and temperature. Teacher section includes: measurement worksheet, game and bulletin board ideas, ruler master, tables. Adaptable for reproduction or making overhead transparencies.

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"Cooking with Metrics". Recipe cards.
BHU
23358 Hartland Street
Canoga Park, CA 91307
Cute, unusual, illustrated recipe cards with catchy names, $5.50

Cortese, Carol E. and Caeleton G. Herer. Metric Measurement. 1974, 60 p. $1.16, paper
American Book Company
Division of Litton Educational Publishing, Inc.
450 West 33rd Street
New York, NY 10001
Illustrated student workbook with answers to activities.

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American Home Economics Association
2010 Massachusetts Avenue, NW
Washington, DC 20036
$2.00 for Complete Package; $3.00 for 10 copies of Student Section. HELPs Series (Home Economics Learning Packages), No. 1055.
Learning package to acquaint students with metric system. Teacher section covers: component ideas, instructional objectives, instructional approach, equipment and materials needed, pre- and post-test keys. Student section covers: learning objectives, pre- and post-tests, learning activities.

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Agriculture Extension Service
Bulletin Room, 1 Coffey Hall
University of Minnesota
St. Paul, MN 55108
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Discover. . .Why Metrics. 1972, 14 min., 16mm, sound, color, $195.00
Swani Publishing Company
Box 248
Roscoe, IL 61703
Cartoon character Metric Mike presents metric symbols and their use. Includes 10 copies of booklet Discover . . . Why Metrics .

Donovan, Frank. Let's Go Metric. 1974, 154 p., $5.95
Weybright and Tallen, Inc.
750 Third Avenue
New York, NY 10017
Explains the seven basic SI units in detail.

Dualpak Metric Wall Charts. 1972, Order No C1 & C2, $6.95 each
Polymetric Services, Inc.
4600 Brewster Drive
Tarzana, CA 91356
Wall charts in color: "U.S. Customary Measure and the Modern International Metric System" and "Seven Basic Units of Measure."

DuShane, G. "Weights and Measures; Arguments for and Against Adoption System," Science, 136:1085, Je 29 '62.

Edson, Lee. "New Dimensions for Practically Everything Metrication," American Education, Vol. 8, No. 3 (April 1972) pp. 10-14.
Educational Teaching Aids
159 West Kinzie Street
Chicago, IL 60610
#804-195 Metric Activity, $12.50 set of 3: Length & Area, Weight, Liquid and volume.

An Educator's Guide to Teaching Metrication. 1974, 8 p.
Consumer Information Services - D/703
Sears Roebuck and Company
Chicago, IL 60684
Free for conferences and workshops.
Metric teacher's guide or student text for teacher education. Includes basic SI metric measurement units, key concepts and levels of instructional objectives in cognitive and affective domains. Learning experiences, individual student activities, and group projects, bibliography and sources of information included.

Fearon, Arthur D. Everyday Metrics. 1974, 32 p., $2.50, paper
Willow House Publishers
P. O. Box 129
Stockton, CA 95201
Cherrington-Fearon-Massey Series of Six Metric Books, Book 5: Grades 11, 12, 13, 14. Complete series of 6 books for $12.00.
Workbook with questions and activities.

Fillinger, Louis. Know The Essentials of Metric Measurement.
Hayes School Publishing Company, Inc.
321 Pennwood Avenue
Wilkinsburg, PA 15211
18 duplicating masters on metric measurement. Teacher guide and answers provided. Tables of metric system for length, capacity, weight, surface measure, and cubic measures.
Book I - 18 p. Teachers guide 4 p. $2.50 #A215 1974, paper
Book II - 18 p. Teachers 5 p. $2.50 #A216 1974, paper

Fisher, Ron. "Metrics is Here, So Let's Get on With It," The Arithmetic Teacher, May 1973, pp. 400-402.

Gaucher, Claire and Sophia Perry. "What Impact Will Metrication Have on Home Economics?" Forecast for Home Economics, March 1974, 19 (7), p. 14-16.

Gilbert, Thomas F. and Marilyn B. Gilbert. Thinking Metric. 1973, 142 p. $2.95, paper
John Wiley & Sons, Inc.
605 Third Avenue
New York, NY 10016
A self-instructional text, with self-tests.

Glaser, Anton. Neater By The Meter, An American Guide to the Metric System, 1974, $6.50; $3.50 paper
Anton Glaser
1237 Whitney Road
Southhampton, PA 18966
Non-technical field-tested book oriented to the needs of everyday life.

Going Metric. Western Michigan University, Kalamazoo, MI, Center for Metric Education, 1974.
Seven sets of transparency masters and scripts for teacher educators. Includes reference material, programmed unit in metric measurement, worksheets, and instructor's notes.

Hallerberg, A.E. "The Metric System: Past, Present - Future?" The Arithmetic Teacher, Vol. 20, No. 4, 1973.

Hartsuch, Paul J. Think Metric Now! A Step-By-Step Guide to Understanding and Applying the Metric System, 1974, 120 p., $3.92
Follett Publishing Co.
1010 West Washington Blvd.
Chicago, IL 60607
Guide to understanding and applying metric system.

Haugaard, James and David Horlack. Contemporary Metric. 1973, $7.95
Prentice Hall Learning Systems, Inc.
P. O. Box 47X
Englewood Cliffs, NJ 07632
Metric resource materials for teachers and students. Wall charts on metric place values, metric comparisons, and table of metric measures. Reproducible binder size charts on metric place values and metric measures. Thirty pages of reproducible task sheets on linear measure, perimeter, area, and addition and subtraction in metrics. Catalog No. 109

Helgren, Fred J. Metric Supplement to Science and Mathematics. Rev. 1973, 28 p., paper, $1.25
Ideal School Supply Company
11000 South Lavergne Avenue
Oak Lawn, IL 60453
Field tested workbook for secondary students.

Henderson, George L. and Lowell D. Glumm. Let's Play Games in Metrics. 1974, 223 p., $6.25, paper, Order No. 8442-3342-0.
National Textbook Company
8259 Niles Center Road
Skokie, IL 60076
177 games and activities arranged by topic and grade level: history of measurement basic units of metric measure, area, volume, and conversion. Activities relate to behavioral objectives. Secondary level.

Henry, Boyd. Teaching The Metric System. 1974, 48 p., $1.50, paper
Weber Costello
1900 North Narragansett Avenue
Chicago, IL 60639
Teacher's guide to metric system. Contains hands-on activities with objectives and required materials.

Higgins, Jon L., ed. A Metric Handbook for Teachers. 144 p., $2.40, paper, spiral bound, 1974.
National Council of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091
Handbook of practical suggestions for teaching metric system at all levels.

Holmberg, Verda. The Metric System of Measurement. Hayward, CA: Activity Resources Co., $5.00, for grades 4-9.

How To Teach Metric Now. 1973, 74 p, $3.00, paper spiral-bound.
Mr. Charles Kolak
Executive Assistant for Public & Staff Information
Worcester Public Schools, 20 Irving Street
Worcester, MA 01609
Guide for K-12 includes introduction, history and related changes, objectives in foods, clothing, woodworking, metalworking, mechanical drawing, mechanics, electricity, electronics. Contains background, reference material, and bibliography.

Hunt, Fern E. "Metric System: Boon or Bane," Proceedings of the 19th Annual Conference of the American Council on Consumer Interests, 1973.

The International Metric System and How It Works, $12.95
Polymetric Services, Inc.
4600 Brewster Drive
Tarzana, CA 91356

The International System of Units (SI). National Bureau of Standards, Pub. 330, 1972, $.30. (SD Catalog No. C13.10:330/2).

Introducing the Metric System. 1972, 4 filmstrips, 2 audio cassettes or 2 records; set of task cards, $66.00 with cassettes, Order No. 3T900; $48.00 with records, Order No 3T800. Items in the kit may be purchased separately: $8.00 per filmstrip; $7.00 per cassette; $5.00 per record; $6.00 per set of task cards.
BFA Educational Media
2211 Michigan Avenue
Santa Monica, CA 90404
Filmstrips entitled: "The Meaning of Metric," "Measuring Length," "Unit of Volume and Mass," introduce commonly used metric units and show interrelationship of units. Final filmstrip covers advantages and disadvantages of metric system. Activity cards provide practice with metric measurement.

Introducing the Metric System. 1969, 68 p., paper, $1.50, (Class set of 25 copies, $30.00)
Coronet Learning Programs
Coronet Films, 65 East South Water Street
Chicago, IL 60601
Field tested programmed textbook.

Jones, Philip G. "Metrics: Schools Will Be Teaching It and You'll Be Living It - Very, Very Soon," The Education Digest, Nov. 1973.

Kelly, Gerard W. Metric System Simplified. 1974, 80 p. $3.95.
Sterling Publishing Company, Inc.
419 Park Avenue South
New York, NY 10016
Emphasizes everyday use of metrics in kitchen, on cars, and in sports.

Kempf, Albert and Thomas Richards, Exploring the Metric System. 1973, 48 p., $.48 plus shipping, paper
Laidlaw Brothers Publishers
A Division of Doubleday
Thatcher and Madison
River Forest, IL 60305
Workbook for levels 4-6. Exercises on length, perimeter, area, volume, capacity, and mass (weight). Self-administered tests with answers. Code #1411.

Kempf, Albert F. and Thomas J. Richards, Using the Metric System. 1973, 64 p. $.51 plus shipping Code #1412.
Laidlaw Brothers
A Division of Doubleday, Thatcher and Madison
River Forest, IL 60305
Senior high student workbook with word problems, measurement exercises, and conversion.

Kim, Margaret and Hedy Knauer. Metricook. Los Angeles: Gallery Books, 1974, $2.95.

Leake, Chauncey D. "Standards of Measurement and Nursery Rhymes," Journal of Home Economics, Vol. 59, No. 2 (Feb. 1967), pp. 116-123.

"Learning How To Use the Metric System," Chevrolet Motor Division General Motors Corporation, 1974.

Massey, Opal. Metrics for Home Use. 1974, 32 p. $2.50, paper
Willow House Publishers
P. O. Box 129
Stockton, CA 95201
Cherrington-Fearon-Massey Series of Six Metric Books, Book 4: Homemaking. Complete series of 6 books is available for $12.00
Workbook in homemaking with questions and activities. Individualized topics include: introduction, home cooking, calories, shopping, cooking utensils, appliances, sewing, fabrics and patterns, furniture, recipes, rules for SI units and decimal multiples and submultiples, area, and volume.

McCully, Helen. "The Metric System. . .plus a Collection of International Recipes," House Beautiful, Jan. 1973, 115 (1), pp. 82-85, 90-92.

McKinley, Clarence P. The Metric System: A Method for Teaching, 1973, 15 p. $2.00, paper
Clarence P. McKinley
Wicomico County Board of Education, Long Avenue
Salisbury, MD 21801
Uses five major concepts in teaching the metric system: the U.S. monetary system is based on a decimal system; advantages of metric measurement; simplicity of metric measurement involving structured system of prefixes attached to basic units of length, mass, and volume; need for transitional conversion skills; metric temperature measurement. Includes problems, exercises and hints.

Measurement and the Metric System Science Packet. 2 conversion cards (6.5 x 9.5 cm, 9 x 29 cm); 1 reference card $3.00, plus $.50 for postage and handling
Item No. (479-14280)
National Science Teachers Association
1742 Connecticut Avenue, NW
Washington, DC 20009

Kit include 30 cm rulers (2) cm graph paper (2 sheets), decimeter cube and and brochure and other instructional aids with activities from many sources. Teacher's Guide includes three lesson plans for package items, section on why metric, and resource list. Module by Xerox contains: objectives, instructional procedures, activities, evaluation, and competency measures for activities.

Measurement With Metric. A Resource Handbook. 1974, 4 p, free, paper
Oregon State Department of Education
942 Lancaster Drive, NE
Salem, OR 97310

Includes rationale for metric education, activities for diagnosis of premeasurement skills, instructor's guide for planning and conducting workshops, materials for program implementation, and bibliography. "Think Metric" and hands-on strategies employed.

Mechtly, E. A. The International System of Units (SI). Washington, DC: NASA, SP-7012, 1969

Merry Metric. (Game), 1974, $3.50, Order No. 4129, Gameboard and scoresheets.
Creative Teaching Associates
P. O. Box 293
Fresno, CA 93708

Game that reinforces the meanings of the prefixes kilo-, hecto-, deka-, deci-, centi-, and milli-, and their relationship to metres, litres, and grams.

Meter-Liter-Gram. (Game), Playing Board (39.5 x 46 cm); 10 tokens; 2 dice; examination cards; chance cards; Instruction Book (23 p.), $9.00
Order No. MG-2
Real-T-Facs
Division of Realty Facts Company
26 Overlook Drive, P. O. Drawer 449
Warwick, NY 10990

Game pieces are cubic centimetres which players advance in response to questions on metric units, symbols, terminology, unit relationships and metric arithmetic. Designed for 2-10 players. Classroom tested. (8 to adult)

Meters, Liters and Kilograms, or How To Weigh Water With a Stick. Metrication Institute of America, Northfield, IL, 1974, 23 min., 16mm, sound, color $310.
Metrication Institute of America
A Division of Perennial Education, Inc.
P. O. Box 236
Northfield, IL 60093

An introduction to the metric system sereis: four films available for $650.00 Both introduction and summary of the content presented in series films "The Meter," "The Liter," and "The Kilogram." Inter-relationship between units is described and extensively illustrated.

"Metr[illegible]-Cookery Adventures," Recipe Cards
Reid Tool Supply Company
Western Michigan's Metric Center
2233 Temple Street
Mushegan Heights, MI 49444

Metri-Kit. $18.95
Swani Publishing Company
Box 248
Roscoe, IL 61703

Kit of metric training aids developed by Regal Beloit includes set of wall posters, measuring devices, converter; publications: "Preparing Now for a Metric Future," "A Metric America," "USA Goes Metric," and "Discover Why Metrics."

A Metric America Series. (Multimedia Kit), $120.00 with cassettes, No F1251; $90.00 with records, No. F1250
Aims Instructional Media Services, Inc.
P. O. Box 1010
Hollywood, CA 90028

Six sound filmstrips covering principle features of metric system stress decimal relationship between units. Prefixes used with each base explained. Study guide included (Jr. High to adult level).

A Metric America (film), 1973, 16 min., 16mm, color, sound, $230.00, Order #9345
Aims Instructional Media Services, Inc.
P. O. Box 1010
Hollywood, CA 90028

Animated presentation of the metric system and its advantages. Decimal nature of the metric system is repeatedly stressed. (JR. High to adult)

Metric Match-Ups. Teacher's Guide for Cooking With Metrics. (multimedia kit) $7.0
Corning Glass Works
Product Information Department
Houghton Park E-1,
Corning, NY 14830

Teacher's lit for secondary homemaking classes. Includes 2 measuring cups 2 wall charts illustrating weight, temperature, volume, and length, teacher's manual with learning activities, 4 overhead transparencies comparing Si and customary system, and 6 spirit masters with recipe suggestions, metric exercises, basic units, and conversions.

Metric Measurement: Activities in Linear Measurement. 1974, 36 p., $3.95, paper 3-hole punched
The Math Group, Inc.
5625 Girard Avenue South
Minneapolis, MN 55419

Illustrated student activity sheets for making ditto or mimeograph masters. Teacher's guide provides objectives and answers. "Think Metric" strategy.

Metric Posters. 1974, $5.00, Order No. 61000
Creative Publications
P. O. Box 10328
Palo Alto, CA 94303

Four colorful posters. It's a Metric World shows nations using metric system; Think Metric shows ease of conversion from one metric unit to another; World Records in metric History of Metric System illustrates how metric system fit in the development of measurement in the western world.

Metric Sampler Kit, $9.00 plus tax
Union Carbide Educational Aids Department
Box 363
Tuxedo, NY 10987
Includes 3 conversion slides, meter tape, 2 wall charts, and 500 ml measuring cup with experiments.

"Metric Study Conference - Consumer Affairs," Journal of Home Economics, May 1971, 63 (5), 345-349.

The Metric System. 1974, 95 p., paper, Student edition #1513, $1.50.
Teacher edition #1514, $2.10
Addison-Wesley Publishing Company
School Division National Headquarters
2725 Sand Hill Road,
Menlo Park, CA 94025
Student workbook for introducing the metric system and developing measuring skills through hands-on activities. Teacher's edition includes process and behavior objectives, teaching suggestions, answers, and information about resources.

Metric System - Parts 1 and 2. 16mm film, color, sound, $150.00 each.
A/V Instruction Systems
P. O. Box 191
Somers, CN 06071

The Metric System and SI Measurements and Systems of Units. Skokie, IL: Sargent-Welch Scientific Co., 1974.

Metrication. (Game), 1973,
Addison-Wesley Publishing Company
School Division National Headquarters
2725 Sand Hill Road
Menlo Park, Ca 94025
Board game for two to four players, ages ten through adult. Metric prefixes appear on metric money. Players attempt to collect at least ten of each type of metric bill. Playing time approximately 1 hour and 20 minutes.

Metrication Masters. 1974, 50 p., $19.98
Holt, Rinehart and Winston, Inc.
383 Madison Avenue
New York, NY 10017
Non-graded duplicating masters on the metric system. Guided discovery approach.

"Metrics," a special issue of School Shop., April 1974.

"Metrics in the Kitchen," University Bulletin Room, University of Minnesota, St. Paul, MN 55108. Leaflet on thinking metric.

Metricube. Item #A1, $5.95
Polymetric Services, Inc.
18324 Oxnard Street
Tarzana, CA 93156
One litre volume cardboard cube with six $100cm^2$ surfaces and edges 100mm in length. Moving parts compare U.S. customary system and SI. Built in calculators convert weights and lengths. Defines seven basic SI units.

Miller, Byron S. and Henry B. Trimbo. "Use of Metric Measurements in Food Preparation," Journal of Home Economics, Feb. 1972, 64 (2), 20-25.

Miller, David Monroe, Understanding the Metric System. A Programmed Approach
1973, 74 p., $2.00, paper Order No. 563715
Allyn and Bacon, Inc.
470 Atlantic Avenue
Boston, MA 02210
Field tested program text for individualized instruction. 345 frames requiring an active response.

Miller, Mary and Toni Richardson. Making Metric Maneuvers, Hayward, CA: Activity Resources Company, Inc., 1974, 106 p., resource guide.

Miller, Mary and Toni Richardson. Merry Metric Cookbook., Hayward, CA: Activity Resources Company, Inc., 1974, $3.00

Mills, Nancy, "The Metric Revolution," Forecast for Home Economics, Dec. 1969, F 28, 38.

Moving Toward Metric, Kit
Educational Relations
J. C. Penney Company, Inc.
1301 Avenue of the Americas
New York, NY 10019
Kit designed to help consumers accept and understand the basics of metric system. Contents include: learning experiences with the metre, Celsius scale and the kilogram, visuals and aids for understanding metric units, and information on metrics progressing from the simple to the complex. Available also "The Metric Song," 6 min. filmstrip/cassette.

Oppert, Judy."The Home Economics Teacher and Metrics,"
Illinois Teacher of Home Economics
351 Education Building
University of Illinois
Urbana, IL 61801
Series of 8 journal lessons on learning and teaching metrics published in Illinois Teacher of Home Economics, v8, n2-5, 1974-75, $7.50 for annual subscription; $5.00 for students. $1.75 per single issue. Includes history and trends, length, area, volume, mass, temperature, applications to consumer and home economics subject areas, guidelines and suggested practices for teaching. Objectives self-study, activity-based, lesson evaluations with answers. Pre- and post-tests to be evaluated by correspondence instructor.

"Opportunity to Learn Metrics," The Illinois Teacher of Home Economics, Vol. XVIII, No. 2, Nov./Dec. 1974, pp. 94-125.

Orf, Earl and Diana Hestwood. Metric Measurement: Activities in Capacity, Mass and Temperature, 1974, 36 p. $3.95, 3 hole-punched paper.
The Math Group, Inc.
5625 Girard Avenue South
Minneapolis, MN 55419
Teacher's guide. Illustrated mimeograph master activity sheets for students and pencil and paper activities on measuring, puzzles, and filling in blanks. "Think metric" strategy.

Page, Chester H. and Paul Vigoureux. The International System of Units (SI)
42 p., 1972 edition, $.30, SD Catalog No. C13.10:330/2, NBS Special Publication 330
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
Defines modernized metric system (SI).

Parker, Frances J. "The Shift Toward Metric," Journal of Home Economics, Nov., 1973, 65 (8), 15-18.

Parker, Frances J. "Think Metric: It's Simple," American Vocational Journal, Sept., 1973, 48 (6), 35-37.

Parsons, Elaine Baldwin. "Introducing the Metric System to Your Classroom", Illinois Teacher, May/June 1975: 318-330; Sept./Oct. 1975: 46-52; Nov./Dec. 1975: 111-114.

Patterson, Joyce, "Think Metric to Meet the Challenge," Forecast for Home Economics, Sept. 1972: F-120-124.

Perry, H. A. "Inching Toward the Metric System," The American Legion Magazine 1972.

Ploutz, Paul F. The Metric System: A Programmed Approach. 1972, 122 p., $2.95 paper, Order No. 9057
Charles E. Merrill Publishing Company
1300 Alum Creek Drive
Columbus, OH 43216
Programmed instruction workbook with answer key.

Powell, Marcia. "Metrication and Food Preparation," What's New in Home Economics Oct. 1974, p. 49.

Powell, Marcia. "Moving Toward Metric," What's New In Home Economics, Sept., 1974, p. 81.

Purchase, M. E. "Metric Measures: Their Use in the United States and in the Home," Home Economics Research Journal, Dec., 1972, 1 (2), 133-135.

Reid, Jane Meldrum. Metrics for Everyday Use. Peoria, IL: Charles A. Bennett Co., Inc., 1975, $2.50

"Report of the National Metric Study Conference - Consumer Affairs," Journal of Home Economics, May 1971, 63 (5), 345-349.

Richardson, Toni and Mary Miller. Metric Maneuvers, Hayward, CA: Activity Resources Co., for grades 2-7, $5.00

Ritchie-Calder, Loard, "Conversion to the Metric System," Scientific American, Vol. 223, July 1970, 17-25.

Robenson, B. L. Education, National Bureau of Standards Publications, 345-346, July 1971.

Rothrock, Bruce D., ed. The Consumer. U.S. Metric Study Interim Report. National Bureau of Standards, 1971, 139 p., $1.25, paper SD Catalog No. C13.10: 345-7
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
U. S. Metric Substudy Reports, NBS SP3457, presents information on consumers' knowledge of metric system, attitudes and opinions regarding metrication in the U.S., and effects of worldwide metric usage on selected areas of consumer concern. Papers by experts on areas of consumer interest.

Schlessinger, Phyllis E. and Barbara M. Kennedy, "Metric Measurements in Food Preparation," Journal of Home Economics, Vol. 59, No. 2, Feb. 1967, pp. 116-119 or 120-123.

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Smith, R. W. The Federal Basis for Weights and Measures. NBS Circular 398, 1958.

Some References on Metric Information. National Bureau of Standards, Publication 389, Dec. 1973, $.25, SD Catalog No. C13.10:389.

Think Metric (Kit) 1973, $.50
The Ohio State University
Cooepartive Extension Service
1787 Neil Avenue
Columbus, OH 43210
Packet of basic materials for consumers and homemakers. Leader's guide with objectives, lesson outline, activities and problems.

Trueblood, Cecil R. Metric Measurement - Activities and Bulletin Boards, Danville, NY: The Instructor Publications, 1973.

Turner, Rufus P. Metrics for the Millions 1974, 96 p., $3.50, paper
Howard W. Sams & Company, Inc.
A Subsidiary of ITT
4300 West 62nd Street
Indianapolis, IN 46268
Contains practice exercises with answers.

Understanding the Metric System, (Series 296)
Associated Educational Materials
Glenwood at Hillsboro Street
Rawleigh, NC
6 cassettes, student worksheets, mastery tests. $42.50

Vervoort, Gerardus, "Inching Our Way Toward the Metric System," The Mathematics Teacher, 1973, 66 (4), 297-302.

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Wallach, Paul. Think Metric, 1974, $80.00 Order No. MET000
DCA Educational Products
424 Valley Road
Warrington, PA 18976
Twenty multi-color transparencies and 18 overlays. Group I, "Metric Units" includes English units, basic SI units and prefixes; Group II "Conversion Factors," for inches, pounds, and kilometres; Group III "Estimating Weights and Measures," shows common objects with alternate overlays in customary or metric units. Teacher's guide with objectives, script, and activities.

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Metric Information Office
National Bureau of Standards
Washington, DC 20234
Three page consumer and homemaking fold-out chart using "Think Metric" illustrations for mass, length, volume and temperature.

What Everyone Should Know About Measurement. 1966, 13 p. $1.00, paper
Channing L. Bete Company, Inc.
45 Federal Street
Greenfield, MA 01301
Illustrated booklet on measurement.

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Pauper Press
Box 303
Two Rivers, WI 54214

Witte, Carol and Betty Long. Fun With Metric Measurement, Manhattan Beach, CA: Teachers, 1973, $5.00

Worshtil, Diana et. al. Think Metric: Adapting to the Metric System. 1974, 42 p. $1.00, paper, spiral-bound
Toledo Public Schools
Manhattan & Elm
Toledo, OH 43608
Teacher's guide with activities.

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